



**Purchasing Office**  
P.O. Box 40197 • Lafayette, LA 70504-0197  
Office: (337) 482-5396  
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UNIVERSITY OF LOUISIANA AT LAFAYETTE  
Lafayette, Louisiana

**SOLICITATION FILE NO. 23202**

**TITLE: RENOVATIONS TO ABDALLA HALL LABORATORY**

**OPTIONAL PRE-BID MEETING (in person): Thursday, May 26, 2022 10:00AM**

**BID SUBMISSION DEADLINE: Tuesday, June 21, 2022 2:00PM**

**ZOOM BID OPENING: Wednesday, June 22, 2022 10:00AM**

**PROPOSAL FOR FURNISHING ALL LABOR, MATERIALS, EQUIPMENT, TRANSPORTATION, SUPERVISION, PERMITS, ETC. NECESSARY FOR THE COMPLETION OF RENOVATIONS TO THE LABORATORY AT ABDALLA HALL, LOCATED ON THE UL LAFAYETTE SOUTH CAMPUS, LAFAYETTE, LOUISIANA, AS DESCRIBED IN THESE SPECIFICATIONS.**

**BID DEADLINE**

The Purchasing Office at the University of Louisiana at Lafayette will electronically receive proposals for this solicitation up to the above-mentioned date and time. Proposals will not be received after this specified hour and date. Bids will be publicly opened and read by a designated employee of the Purchasing Department.

This is a *Competitive Sealed Bid*. See *Guidelines for Electronic Submission of Bids and Virtual Bid Openings* on page 4 of this solicitation, which contains complete details for submitting bids. Further information can be found in the attached INSTRUCTIONS TO BIDDERS.

Bidders submitting bids in the amount of \$50,000.00 or more SHALL show their license number in the subject line of their electronic bid submission; bids not submitted in accordance with this requirement, SHALL be rejected and shall not be read.

Bid must be received by the due date and time in the Purchasing Office as per the instructions outlined in this solicitation.

Bid must be submitted with the BID NUMBER IN THE SUBJECT LINE of the electronic submission. The public bid opening will take place on Wednesday, June 22, 2022 at 10:00AM on Zoom, which is available for viewing by registering at

<https://ullafayette.zoom.us/meeting/register/tJAqfumtrj8qGdTUEmcvNekoiAtJbyVGJfYW>.

Meeting ID: 947 9050 4030      Passcode: 998138

All inquiries regarding this request shall be directed to the Director of Purchasing at (337) 482-2955 or [purchasing@louisiana.edu](mailto:purchasing@louisiana.edu).

Attached is the completed proposal of the firm listed below. The undersigned certifies that he/she (or they) has/have carefully examined *the Instructions to Bidders, the General Conditions, and the Specifications* hereto attached and made part herein, and agrees to comply with the instructions, conditions, and specifications, as covered by the attached papers. On the basis of the specifications, the undersigned proposes to furnish any or all items listed in the schedule of items hereto attached, upon which prices are requested, and at the price stated for each item.

\_\_\_\_\_  
Firm Name

\_\_\_\_\_  
Signature [By signing this bid, bidder certifies compliance with La. R.S. 38:2212(A)(1)(c) or RS 38:2212(0)]

\_\_\_\_\_  
Address

\_\_\_\_\_  
Name (Printed)

\_\_\_\_\_  
City, State, Zip Code

\_\_\_\_\_  
Title

\_\_\_\_\_  
Telephone No. including area code

\_\_\_\_\_  
Date

\_\_\_\_\_  
Louisiana Contractor's License Number

\_\_\_\_\_  
E-Mail

## **GENERAL SPECIFICATIONS**

**FURNISH ALL LABOR, MATERIALS, EQUIPMENT, TRANSPORTATION, SUPERVISION, PERMITS, ETC. NECESSARY FOR THE COMPLETION OF RENOVATIONS TO THE LABORATORY AT ABDALLA HALL, LOCATED ON THE UL LAFAYETTE SOUTH CAMPUS, LAFAYETTE, LOUISIANA, AS DESCRIBED IN THESE SPECIFICATIONS...**

### **SCOPE OF WORK**

1. Demolition to remove sections of the existing ceilings (then reinstall), flooring (if Alt. No.3 is accepted), sections of block chase walls and drywall chases, HVAC ductwork, fans, curbs, and electrical on roof. Roof work and roof repair work.
2. Construction to install new studs and drywall for new chase walls and a temporary wall to close off room access opening.
3. Prepping and painting of existing and new walls.
4. Construction to install new concrete for a short chain wall with reinforcement at gas cylinder yard.
5. Construction to install a new block wall around cylinder yard with reinforcement and gate.
6. Construction to install (4) new University supplied fume hoods and associated cabinets.
7. New electrical service to new panels, HVAC equipment, hoods, cabinets, tables, exhaust fans, existing lighting, receptacles, etc.
8. To add Alternates No. 1, No.2, No.3. See plans and specifications for details.
9. To provide a forklift, operator, and assistance to lift and set in place the (4) new fume hoods.
10. Clean area daily and at completion of debris and dust. University dumpster use is prohibited.

### **COMPLIANCE TO SCHEDULE/LIQUIDATED DAMAGES**

**DUE TO THE IMPORTANCE OF THE SCHEDULE, LIQUIDATED DAMAGES IN THE AMOUNT OF ONE HUNDRED DOLLARS (\$100.00) PER DAY WILL BE ASSESSED FOR EVERY CALENDAR DAY THAT THIS PROJECT IS NOT COMPLETE BEYOND THREE HUNDRED (300) DAYS OF THE NOTICE TO PROCEED.**

### **BID SECURITY REQUIREMENTS**

Each bidder MUST accompany his/her proposal with a bid security for five percent (5%) of the total maximum amount of his/her bid. The bid security shall be drawn in favor of the University of Louisiana at Lafayette and SHALL be in the form of a Bid Bond (Insurance Company), Bank Money Order\*, Certified Check\* or Cashier's Check\*. It shall become the property of the Owner in the event the contract and any performance bond are not executed within the time set forth. Bid bond shall be written by a surety or insurance company currently on the US Department of the Treasury Financial Management Service List of Approved Bonding Companies which is published annually in the Federal Register, or by a Louisiana domiciled insurance company with at least an "A-" Rating in the latest printing of the AM Best's Key Rating Guide to write individual bonds up to ten percent (10%) of policyholders' surplus as shown in the AM Best's Key Rating Guide.

Successful bidder WILL BE required to execute and deliver within ten (10) days of notification, a satisfactory performance bond and payment bond in the amount of one hundred percent (100%) of the contract price. Performance Bond, with Power of Attorney, shall be secured by a surety or insurance company currently on the US Department of the Treasury Financial Management Service List of Approved Bonding Companies, and in accordance with restrictions set by them or by an insurance company that is either domiciled in Louisiana or owned by Louisiana residents and is licensed to write surety bonds. In addition, any surety bond written for a public works Project shall be written by a surety or insurance company that is currently licensed to do business in the State of Louisiana. Also, to be provided at the same time is a Labor and Materials payment Bond in an amount equal to one hundred percent (100%) of the contract amount.

\*Bid security in the form of a Bank Money Order, Certified Check or Cashier's Check shall be scanned and included with the bid submission (front and back) and the original must be mailed to and received no later than 3 business days after the bid opening.

University of Louisiana at Lafayette  
Purchasing Office  
PO Box 40197  
Lafayette, LA 70504-0197

#### **LOUISIANA CONTRACTORS LICENSE REQUIREMENTS**

Contractors or contracting firms submitting bids in the amount of \$50,000.00 or more shall certify that they are licensed contractors under Chapter 24 of Title 37 of the Louisiana Revised Statutes 1950 and show their license number ~~on the front of the sealed envelope in which their bid is enclosed~~ in the subject line of the email submission. Bids shall be accepted from Contractors who are licensed under L.A. R.S. 37:2150-2163 in the following classification: **BUILDING CONSTRUCTION**. Bids in the amount of \$50,000.00 or more, not submitted in accordance with this requirement, shall be rejected and shall not be read. Additional information relative to licensing may be obtained from the Louisiana State Licensing Board for Contractors, Baton Rouge, Louisiana.

In accordance with La. R.S. 38:2227, LA. R.S. 38:2212.10 and LA. R.S. 23:1726(B) each bidder on this Project must submit a completed Attestations Affidavit (Past Criminal Convictions of Bidders, Verification of Employees and Certification Regarding Unpaid Workers Compensation Insurance) form found within this bid package. The Attestations Affidavit form shall be submitted to the Purchasing Department within 10 days **after** the opening of bids. **Affidavits submitted with the Bid Documents, prior to the opening of bids, will not be accepted in accordance with stated Revised Statute.**

#### **PROHIBITION OF DISCRIMINATORY BOYCOTTS OF ISRAEL**

In accordance with LA R.S. 39:1602:1, for any contract for \$100,000 or more and for any contractor with five or more employees, Contractor, or any Subcontractor, shall certify it is not engaging in a boycott of Israel, and shall, for the duration of this contract, refrain from a boycott of Israel.

The State reserves the right to terminate this contract if the Contractor, or any Subcontractor, engages in a boycott of Israel during the term of the contract.

#### **BUSINESS HOURS**

Please send all correspondence electronically or through USPS. In-person delivery of document(s) will NOT be accepted. Business hours are Monday through Thursday, 7:30 am to 11:45 am, 12:30 pm to 5:00 pm, and Friday, 7:30 am to 12:30 pm. The Purchasing Office will be closed during Federal, State and University holidays. It is the responsibility of the prospective bidder to be aware of such closures.

Please note that courier services such as UPS, FedEx, and DHL will be **UNABLE to deliver to the Purchasing Office**. See *Guidelines for Electronic Submission of Bids and Virtual Bid Openings on page 4 of this solicitation for more detailed information.*

In providing this bid, each bidder represents that: They have read and understand the bid documents and the bid is made in accordance herewith, and the bid is based upon the specifications described in the bid documents without exception.

#### **SITE VISIT/CONTACT INFORMATION**

It is the responsibility of the prospective bidder to visit and examine jobsite, take measurements to his/her own satisfaction and determine conditions under which work is to be done. Owner will not accept responsibility for conditions which careful examination of premises would have shown existed.

To visit jobsite and for further information, prospective bidder is to contact Scott Hebert, 337-482-2001.

#### **PRE-BID MEETING INFORMATION**

A pre-bid meeting will be held **Thursday, May 26, 2022 at 10:00AM** at the Facility Management Department, Parker Hall, 310 E. Lewis Street, Lafayette, Louisiana, at which time details of plans and specifications will be discussed.

#### **TAX RELATED INFORMATION**

It is the responsibility of the prospective bidder to pay taxes on materials purchased for this project. The University of



Louisiana at Lafayette is a tax exempt State Agency. However, that tax exempt status does not transfer to its contractors, subcontractors, suppliers, or vendors for their use.

For further information, prospective bidder should contact the Purchasing Department at [purchasing@louisiana.edu](mailto:purchasing@louisiana.edu), or call Roxanne Formeller at 337-482-2955.

## END OF SECTION

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### Guidelines for Electronic Submission of Bids and Virtual Bid Openings

In keeping with the physical distancing guidelines associated with COVID-19 Public Health Emergency declared by Governor John Bel Edwards in Proclamation Numbers 41, 33, 32, 30, 27, and 25 JBE 2020, the Purchasing Department at the University of Louisiana at Lafayette is suspending in-person attendance at public bid openings. All tasks associated with sealed bids and corresponding bid openings will be completed electronically to the greatest extent possible.

### **BID SUBMISSIONS - USPS Mail bid submittal and In-person delivery of bids at the Purchasing Office ARE NO LONGER ACCEPTED.**

This information applies to competitive sealed bids. Bidders shall submit proposals by EMAIL ONLY:

**Electronic submittal:** Bidders must submit bids electronically containing the mandatory information detailed in the bid specifications to be considered for the bid award. Without exception, the bid must be received at [ULLafayetteBids@louisiana.edu](mailto:ULLafayetteBids@louisiana.edu) on or before the date and time specified as its deadline. Bidders e-mailing their bids should allow sufficient time to ensure receipt of their proposal by the time specified. The timestamp recorded in the email acknowledgement shall be the official time of the submission.

The electronic submittal must contain the following information in the Subject Line:

File Number

Company Name

LA Contractor's License No. (if applicable)

If the file size of the email submission exceeds server requirements, the email submission may be broken into smaller email messages with "Part 1 of \_\_\_\_" **included at the end of each original Subject Line** (e.g. File No. 23202 – ABC Contractors, License No. 12345, Part 1 of 3).

The University assumes no responsibility for assuring accurate/complete e-mail transmission and receipt. The responsibility lies solely with each bidder to ensure their submission is received at the specified email address prior to the deadline. Proposals received after the deadline, corrupted files, and incomplete submissions (e.g. Part 1 and Part 2 of 3 are received, but Part 3 is not) shall not be considered.

Bids advertised on LAPAC will show a solicitation file number formatted like 50011-ULLAF#####. It is only necessary to include the last five (5) digits of that number in the Subject Line.

Bids shall be submitted in .pdf format.

Faxed submittals will not be accepted.

### **Bid Submissions for Public Works/Construction**

In addition to the above, the following applies to Title 38 Public Works electronic bid submittals.

The bidder must sign electronically or submit a scanned signature on the Louisiana Uniform Public Works Bid Form.

As stated on the Louisiana Uniform Public Works Bid Form, a corporate resolution or written evidence of the authority of the person signing the bid for the public work as prescribed by LA R.S. 38:2212(B)(5) shall be enclosed, if your business is a corporation.

Bid submittal shall include security equal to 5% of bid. bid security shall be drawn in favor of the University of Louisiana at Lafayette and SHALL be in the form of a Bid Bond (Insurance Company), Bank Money Order\*, Certified Check\* or Cashier's Check\*.

\*Bid security in the form of a Bank Money Order\*, Certified Check\* or Cashier's Check\* shall be accepted as bid security when submitting bids electronically if both the front and back of the bid security is scanned and included with the bid submission.

The hard copy of that document must be received no later than three (3) business days after the bid opening at:

**University of Louisiana at Lafayette**  
**Purchasing Office**  
**PO Box 40197**  
**Lafayette, LA 70504-0197**

Louisiana Contractor's License Number shall be in the subject line of the bid for ALL bids greater than or equal to \$50,000.00. Bids for Plumbing/Electrical/Mechanical Work greater than or equal to \$10,000.00 shall disclose the Louisiana Contractor's License Number in the Subject Line.

Asbestos Abatement bids exceeding \$1.00 shall disclose the Louisiana Contractor's License Number in the Subject Line.

#### **BID OPENINGS**

Bid openings will continue to be open to the public, conducted virtually using Zoom. To ensure an accurate list of attendees, parties interested in viewing the opening must register for the meeting.

The link to register for each bid opening shall be provided with the Invitation to Bid. The link will be live at that time and will provide live audio access to the bid opening.

The Bid Opening Zoom meeting shall begin at the top of the hour listed in the specifications as the Bid Opening time. The actual opening of bids shall begin at five (5) past the hour to allow all attendees to log in and sign in properly. The public bid opening for this solicitation will take place on **Friday, May 27, 2022 at 10:00AM**, which is available for viewing by registering at:

<https://ullafayette.zoom.us/meeting/register/tJAqfumtrj8qGdTUEmcvNekoiAtJbyVGJfYW>.

**Meeting ID:** 947 9050 4030      **Passcode:** 998138

Requests for bid tabulations and solicitation inquiries should be directed to [purchasing@louisiana.edu](mailto:purchasing@louisiana.edu) as listed in the solicitation/ITB.

**END OF SECTION**

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**VENDOR CHECK LIST****REQUIRED FORMS/ITEMS UPON BID SUBMISSION**

- \_\_\_\_\_ Louisiana Uniform Public Works Bid Form
- \_\_\_\_\_ Bid Security Equal to 5% of Bid
- \_\_\_\_\_ Louisiana Contractor's License Number (If Applicable) **in Subject Line of email**
- \_\_\_\_\_ If company bidding is a corporation, Corporate Resolution or written evidence of authority of person signing the bid for the public work (See ***\*\*annotation on Louisiana Public Work Bid Form.***)

**REQUIRED FORMS AFTER BID OPENING/UPON BID AWARD**

- \_\_\_\_\_ Attestation Affidavit (ALL BIDDERS, WITHIN 10 DAYS OF BID OPENING)
- \_\_\_\_\_ Non-Collusion Affidavit (LOW BIDDER, WITHIN 10 DAYS OF REQUEST)
- \_\_\_\_\_ Disclosure of Ownership Affidavit (LOW BIDDER, WITHIN 10 DAYS OF REQUEST)
- \_\_\_\_\_ Performance and Payment Bond (LOW BIDDER, WITHIN 10 DAYS OF REQUEST)
- \_\_\_\_\_ Certificate of Insurance (*Insurance requirements revised February 2019*)
- \_\_\_\_\_ Certificate of Recordation of Contract and Bonds
- \_\_\_\_\_ Clear Lien Certificate

**CONTACT INFORMATION****ELECTRONIC BID SUBMISSIONS (ONLY)** *Do not email questions about the bid to this email address.*

[ULLafayetteBids@louisiana.edu](mailto:ULLafayetteBids@louisiana.edu)

Be sure to include the solicitation number in the subject line.

**Do not** send your submission to any other University email address.

**QUESTIONS/CONCERNS ABOUT SPECIFICATIONS**

[purchasing@louisiana.edu](mailto:purchasing@louisiana.edu)

[roxanne.formeller@louisiana.edu](mailto:roxanne.formeller@louisiana.edu)

**Do not** email bid submissions to either of these addresses.

To contact Purchasing by phone: 337.482.2955.

**CAMPUS DELIVERIES**

The campus is not fully open for receiving deliveries by courier at this time. Please send samples or other associated documents via US Mail only when a hard copy is requested or deemed necessary. The UL-Lafayette Post Office (located inside the Student Union) will accept packages with proper postage to place in the Purchasing Department's mailbox. The phone number is 337.482.6113.

DETAILED SPECIFICATIONS**PROPOSAL FOR FURNISHING ALL LABOR, MATERIALS, EQUIPMENT, TRANSPORTATION, SUPERVISION, PERMITS, ETC. NECESSARY FOR THE COMPLETION OF RENOVATIONS TO THE LABORATORY AT ABDALLA HALL, LOCATED ON THE UL LAFAYETTE SOUTH CAMPUS, LAFAYETTE, LOUISIANA, AS DESCRIBED IN THESE SPECIFICATIONS...****Base Bid****SCOPE OF WORK**

1. Demolition to remove sections of the existing ceilings (then reinstall), flooring (if Alt. No.3 is accepted), sections of block chase walls and drywall chases, HVAC ductwork, fans, curbs, and electrical on roof. Roof work and roof repair work.
2. Construction to install new studs and drywall for new chase walls and a temporary wall to close off room access opening.
3. Prepping and painting of existing and new walls.
4. Construction to install new concrete for a short chain wall with reinforcement at gas cylinder yard.
5. Construction to install a new block wall around cylinder yard with reinforcement and gate.
6. Construction to install (4) new University supplied fume hoods and associated cabinets.
7. New electrical service to new panels, HVAC equipment, hoods, cabinets, tables, exhaust fans, existing lighting, receptacles, etc.
8. To add Alternates No. 1, No.2, No.3. See plans and specifications for details.
9. To provide a forklift, operator, and assistance to lift and set in place the (4) new fume hoods.
10. Clean area daily and at completion of debris and dust. University dumpster use is prohibited.

**Contractor shall not perform any construction or demo until ULL is contacted to have the fire alarm devices removed or covered and the system put in TEST mode.**

**DEMOLITION**

Contractor shall perform any, and all demolition necessary to prepare the entire area, including but not limited to, an existing window, existing walls and chases, ceilings, flooring, electrical, HVAC, etc., as necessary for construction and finishes called for in the specifications for the new floor plan and finishes.

Contractor shall do all other incidental work, not listed, for the proper and complete performance of this contract.

Contractor shall demo existing block wall chases, drywall chases, rated drywall chases above the ceiling, HVAC duct, and electrical as shown on plans.

Contractor shall remove the existing drywall duct chase, existing HVAC duct, and repair existing concrete floor with concrete to fill in opening.

Contractor shall remove the existing window and wall section (large enough to pass new equipment) as shown on plans to allow the passage of the new fume hoods and cabinets.

Contractor shall install a temporary plywood or sheet rock wall, with temporary sealed joints to prevent air passage, for future use of Phase 2 work.

Existing data cables and outlets in room 201 shall be re-used so the contractor shall take precautions when doing the demo and/or construction to protect them from damage. They shall be removed from existing locations and relocated to the new locations as per the drawings.

To remove (2) existing exhaust fans, curbs, sleepers, duct, and electrical on the roof and repair roof with Heatweld Dynaquad System only. No cold applied roof system accepted.

The existing carpet and base shall be removed by the University unless **Alternate No.3 is accepted then this contractor shall remove the existing carpet and base.**

### Wall Construction

Contractor shall carefully layout for new partitions by placing chalk lines on the existing floor. Ken Savage shall be called to verify and approve locations prior to beginning wall construction.

Contractor shall furnish all materials etc. to install new 3 1/2" x 12' metal/wood studs and 5/8", Type "X" high-impact (Purple rock) sheet rock, drywall partitions as indicated in drawings. Studs shall extend to deck or structure above. Drywall shall extend to 6" above the new ceiling height. The final wall thickness will be as indicated on plans.

New partitions shall be braced to structure above, the adjacent walls, and to the floor slab below.

All drywall shall be 5/8" Type "X", high-impact (purple rock) sheet rock.

Contractor shall repair all holes and deficiencies on all existing walls (especially where block chase walls were removed), with like materials to an unnoticeable finish in all rooms prior to any paint.

### PAINTING

Where existing doors and frames, walls, ceilings, or any other previously painted objects of any kind are to remain, the contractor shall be required to properly prepare and paint them.

Contractor shall patch, putty, tape, float, sand, skim coat, prime, and paint new walls to match the new paint type and colors.

Contractor shall tape, float, skim coat, sand, prime, and paint new drywall partitions for a smooth uniform texture.

Contractor shall refinish the existing door, both sides, in the construction area, in a finish to closely match the existing (original) finish and color.

Contractor shall refinish existing the frame both sides at the hall and room, in a finish to closely match the existing (original) finish and color.

Wood Surfaces (existing "natural" finished doors)

Sand the entire door, both sides, fill cracks and defects with natural paste filler (if necessary tinted with oil stain before final finishing). First, second, and third coats, polyurethane, satin, clear plastic varnish. Buff lightly with extra fine steel wool between coats.

All paint preparation and application shall be according to manufacturer recommendations for application on the substrates to receive paint.

All wall paint shall be Satin or Eggshell.

Colors shall be selected by the University.

**FERROUS METALS**

First coat PPG inhibitive metal primer, tinted with desired color. Second coat, Speedhide, Exterior-interior Alkyd Semi-gloss enamel. Roughen pre-finished items as required for good paint adhesion. (Frames, metal doors, AC grilles, etc.)

**GYPSUM BOARD AND EXISTING PLASTER/BLOCK WALLS**

First coat, Latex primer-sealer.

Second and third coat, Sherwin Williams, coat Acrylic Latex Satin, enamel Super paint, class A.

**BLOCK SEALERS**

Contractor shall pressure wash new Block walls at gas cylinder yard and apply (2) heavy coats of Therocoat Cementous Coating.

Color selected by the University.

**SUSPENDED CEILING SYSTEM – PHASE 1**

THE EXISTING CEILING IN ROOM 201 IS AN EXTENSION OF THE HIGH CEILING IN OPEN LAB ROOM 181. CEILING GRID IN ROOM 201 SHALL REMAIN THE SAME HEIGHT AND LAYOUT AS BEFORE WITH THE EXCEPTION OF THE NEW LIGHT FIXTURE LAYOUT.

CONTRACTOR SHALL EXAMINE AND SECURE THE EXISTING CEILING NOT TO ALLOW SHIFTING, RACKING, OR FALLING IN EACH ROOM PRIOR TO REMOVAL. SHOULD THE EXISTING CEILING BE DAMAGED DURING REMOVAL AND/OR CONSTRUCTION, IT SHALL BE REPAIRED/REPLACED AT NO COST TO THE UNIVERSITY.

Contractor shall carefully remove existing ceiling grid and tile enough to allow all mechanical and electrical work to be installed then reinstall.

Where existing chases were removed, contractor shall fill in areas with ceiling grid and ceiling tile.

**ACOUSTICAL PANEL CEILINGS - PHASE 2****SUMMARY**

This Section includes the following: Acoustical panel ceilings installed with exposed suspension systems. Exposed suspension system, and Wire hangers, fasteners, main runners, cross tees, and wall angle moldings.

**SUBMITTALS**

General: Submit the following in accordance with Specification Sections.

Product data for each type of product specified.

Samples for selection purposes in form of actual sections of acoustical units and suspension system members showing full range of colors, textures, and patterns available for each type of unit indicated.

6-inch-square samples of each acoustical panel type, pattern, and color.

Set of 12-inch-long samples of exposed suspension system members, including moldings and bulkhead trim, for each color and system type required.

**QUALITY ASSURANCE**

Installer Qualifications: Engage an experienced installer who has completed acoustical panel ceilings similar in material, design, and extent to that indicated for this Project and with a record of successful in-service performance.

Source Limitations for Ceiling Units: Obtain each acoustical panel from one source with resources to provide products of consistent quality in appearance and physical properties without delaying the Work.

Source Limitations for Suspension System: Obtain each suspension system from one source with resources to provide products of consistent quality in appearance and physical properties without delaying the Work.

Surface-burning characteristics of acoustical panels comply with ASTM E 1264 for Class A materials as determined by testing identical products per ASTM E 84.

### **DELIVERY, STORAGE, AND HANDLING**

Deliver acoustical ceiling units to project site in original, unopened packages and store them in a fully enclosed space where they will be protected against damage from moisture, direct sunlight, surface contamination, and other causes.

Before installing acoustical ceiling units, permit them to reach room temperature and a stabilized moisture content.

Handle acoustical ceiling units carefully to avoid chipping edges or damaging units in any way.

### **PROJECT CONDITIONS**

Environmental Limitations: Do not install interior acoustical ceilings until space is enclosed and weatherproof, wet-work in space is completed and nominally dry, work above ceilings is complete, and ambient conditions of temperature and humidity will be continuously maintained at values near those indicated for final occupancy.

### **COORDINATION**

Coordinate layout and installation of acoustical ceiling units and suspension system components with other construction that penetrates ceilings or is supported by them, including light fixtures, HVAC equipment, and partition system (if any).

### **EXTRA MATERIALS**

Deliver extra materials to Owner. Furnish extra materials described below that match products installed, are packaged with protective covering for storage, and are identified with appropriate labels.

Acoustical Ceiling Units: Furnish quantity of full-size units equal to 1.0 percent of each type installed.

Exposed Suspension System Components: Furnish quantity of each exposed component equal to 1.0 percent of amount installed.

### **ACOUSTICAL CEILING UNITS, GENERAL**

Standard for Acoustical Ceiling Units: Provide manufacturers' standard units of configuration indicated that comply with ASTM E 1264 classifications as designated by reference to types, patterns, acoustical ratings, and light reflectance, unless otherwise indicated.

### **2' x 2' CEILING PANELS FOR ROOM 201 - PHASE 2**

PERFORMA – "VINYLROCK" (or approved equal)

Perforated and Fissured Pattern: Units fitting ASTM E 1264 pattern designations C and E, with other panel characteristics as follows: Color/Light Reflectance Coefficient: White/LR 0.80 (min.). Color: White. Noise Reduction Coefficient: NRC 0.50, minimum. Ceiling Attenuation Class: Non-Fire Rated: CAC 35-39. Edge Detail: Square. Size: Nominal 24" X 24" by 5/8 inch thick. Warranty: Ten years to withstand temperature and humidity conditions up to 104 degrees F / 90% relative humidity without visible sag.

Available Products: Subject to compliance with requirements, products which may be incorporated in the Work include, but are not limited to, the following: Mineral-Base Panels - Water Felted, with Painted Finish and Perforated and Fissured Pattern, Non-Fire-Resistance Rated: "Ceramaguard #605", Lay-in Ceiling tile, with Armstrong ALPrelude XL, 15/16"

aluminum grid, white, baked-on paint finish, grid with minimum 12 gauge aluminum hanger wires, Armstrong World Industries, Inc.

### **METAL SUSPENSION SYSTEMS, GENERAL**

Standard for Metal Suspension Systems: Provide manufacturer's standard metal suspension systems of types, structural classifications, and finishes indicated that comply with applicable ASTM C 635 requirements.

Finishes and Colors: Provide manufacturer's standard factory-applied finish to match color of ceiling panels selected for each type of system indicated.

Attachment Devices: Size for 5 times design load indicated in ASTM C 635, Table 1, Direct Hung unless otherwise indicated.

Wire for Hangers and Ties: ASTM A 641, Class 1 zinc coating, soft temper.

Gage: Provide wire sized so that stress at 3 times hanger design load (ASTM C 635, Table 1, Direct- Hung), will be less than yield stress of wire, but provide not less than 0.106-inch diameter (12 gage) except where required to support grid at light fixture, use 9-gage wire.

Edge Moldings and Trim: Metal or extruded aluminum of types and profiles indicated or, if not indicated, manufacturer's standard moldings for edges and penetrations that fit type of edge detail and suspension system indicated.

### **NON-FIRE-RESISTANCE-RATED DIRECT-HUNG SUSPENSION SYSTEMS**

Wide-Face, Capped, Double-Web, Steel Suspension System: Main and cross-runners roll-formed from pre-painted or electrolytic zinc-coated cold-rolled steel sheet, with pre-finished 15/16-inch-wide metal caps on flanges; other characteristics as follows:

Structural Classification: Intermediate-Duty System.

Cap Material and Finish: Steel cold-rolled sheet.

Areas of Lay-in Panel Installation: Steel sheet painted white.

### **EXAMINATION**

Examine substrates and structural framing to which ceiling system attaches or abuts, with Installer present, for compliance with requirements specified in this and other sections that affect installation and anchorage of ceiling system. Do not proceed with installation until unsatisfactory conditions have been corrected.

### **PREPARATION**

Coordination: Furnish layouts for preset inserts, clips, and other ceiling anchors whose installation is specified in other sections.

Measure each ceiling area and establish layout of acoustical units to balance border widths at opposite edges of each ceiling. Avoid use of less-than-half-width units at borders and comply with reflected ceiling plans.

### **INSTALLATION**

General: Install acoustical ceiling systems to comply with installation standard referenced below, per manufacturer's instructions and CISCA "Ceiling Systems Handbook."

Standard for Installation of Ceiling Suspension Systems: Comply with ASTM C 636.



Suspend ceiling hangers from building structural members and as follows:

1. Install hangers, plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structural or ceiling suspension system. Splay hangers only where required to miss obstructions and offset resulting horizontal forces by bracing, counter splaying, or other equally effective means.
2. Where width of ducts and other construction within ceiling plenum produces hanger spacing that interfere with the location of hangers at spacing required to support standard suspension system members, install supplemental suspension members and hangers in form of trapezes or equivalent devices. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced standards.
3. Secure wire hangers by looping and wire-tying with a minimum of three tight turns, either directly to structures or to inserts, eye-screws, or other devices that are secure and appropriate for substrate, and in a manner that will not cause them to deteriorate or otherwise fail due to age, corrosion, or elevated temperatures.
4. Do not support ceilings directly from permanent metal forms; Fasten hangers to cast-in-place hanger inserts, power-actuated fasteners, or drilled-in anchors that extend through forms into concrete.
5. Do not attach hangers to steel deck tabs or to steel roof deck. Attach hangers to structural members.
6. Space hangers not more than 4'-0" O.C. along each member supported directly from hangers, unless otherwise shown, and provide hangers not more than 8 inches from ends of each member.
7. Install main beams perpendicular to the 6 inch wide Technical Panels.
8. In addition to hanger wire specified above, provide hanger wire at each of the following locations secured to structure above.
  - a) Two diagonally opposed corners of light fixture. Light fixture shall be independently supported from the ceiling suspension grid.
  - b) Mid-span of all cross tees adjacent to light fixtures.
  - c) Mid-span of all cross tees adjacent to air outlets.
  - d) Adjacent to each main runner splice. Install edge moldings of type indicated at perimeter of acoustical ceiling area and where necessary to conceal edges of acoustical units.
9. Apply acoustical sealant on all acoustically rated partitions in a continuous ribbon on back of vertical legs of moldings before they are installed.
10. Screw-attach moldings to substrate at intervals not over 16 inches O.C. and not more than 3 inches from ends, leveling with ceiling suspension system to tolerance of 1/8 inch in 12'-0". Miter corners accurately and connect securely.
11. Do not use exposed fasteners, including pop rivets, on moldings and trim.

Install suspension system runners so they are square and securely interlocked with one another. Remove and replace dented, bent, or kinked members.

Install acoustical panels in coordination with suspension system, with edges concealed by support of suspension members. Scribe and cut panels to fit accurately at borders and at penetrations, including sprinkler head penetrations.

### **CLEANING**

Clean exposed surfaces of acoustical ceilings, including trim, edge moldings, and suspension members. Comply with manufacturer's instructions for cleaning and touch-up of minor finish damage. Remove and replace work that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

### **ALTERNATE NO.3 - FLOORING**

Contractor shall ensure that all floor substrate surfaces are checked for irregularities and inconsistent surface elevations prior to the installation of the new floor tiles.

Contractor shall float the entire area as necessary (every room) to achieve manufacturer's recommended minimum elevation variations prior to flooring installation (preferably prior to painting of walls) and shall include those expenses in his bid price. Failure to float existing floor is subject to rejection of new flooring should it be inconsistent and noticeably uneven.

Contractor shall patch, float, and/or grind existing building floor to achieve a smooth transition.

Contractor shall provide samples of texture and colors of flooring and base prior to ordering.

Contractor shall furnish and install a transition strip at stairwell flooring to new vinyl plank flooring transition in room 201.

Contractor shall gradually float existing floor at transition strips if needed for a smooth and level transition.

#### **ALTERNATE NO.3 - VINYL PLANK**

Contractor shall furnish and install Vinyl Plank flooring in room 201. Flooring shall be glued down. Submit colors and styles prior to ordering.

New vinyl plank shall be: Earthwerks, Portia, Vanity POR 734, 6" x 36" planks.

New Base shall be: Johnsonite, Black 040, 4".

Contractor shall meet the floor tile manufacturer's warranty requirements and specifications for the type of flooring installation and conditions. Color to be selected by the University.

Contractor shall furnish and install vinyl cove base in room 201 as noted on the plans, 1/8" x 4", made by Johnsonite. Installed with Ardex/Henry "System One" products and adhesives on all walls in the construction area. Color to be selected by the University.

#### **CONCRETE**

The Contractor shall furnish all labor, materials, equipment, transportation, supervision, etc. necessary to remove existing soil, grade existing surfaces, and pour concrete in accordance with the plans.

**It is the responsibility of the contractor to examine, study, establish existing grades and provide finish grades on the surface and in the ground to attain positive drainage of the new concrete work with the existing concrete and sidewalks.**

**Contractor shall be responsible for locating and identifying all existing utilities prior to any work.**

**Contractor shall install all concrete and brick work according to the details provided on the plans.**

#### **SCHEDULING OF WORK**

The work will be scheduled by UL Lafayette Physical Plant. The Contractor shall begin the work within ten (10) working days from the date of the University's request. The Contractor shall expedite the construction of sidewalks and striping of drives once the preparations, such as grading, etc., have begun. In other words, the Contractor shall work without interruption (except as due to weather), until the sidewalks and drives are completed. The Contractor shall provide a work force of sufficient size to complete the project within a minimum amount of time.

#### **QUALIFICATIONS**

Contractor must be able to furnish qualified concrete finishers, equipment operators, etc. This crew must be qualified to work with a minimum amount of supervision and accomplish the job as drawn and in an acceptable manner. If in the opinion of the University the crew supplied cannot perform the required work, the University

may cancel the remaining portion of this contract. Contractor may be required to supply a summary of experience indicating the ability of the Contractor to perform the required work.

#### **UTILITY SERVICES**

Survey existing conditions and correlate with drawings and specifications to determine extent of demolition required. Contractor shall contact DOTTIE to have the existing utilities located before any demolition is performed. The contractor shall be responsible for locating, identifying, and avoiding all underground utility lines as well as power poles supporting overhead electrical and data services.

#### **MATERIALS**

Contractor shall furnish Portland Cement Concrete having a minimum compressive strength of 3500 psi at 28 working days.

Contractor shall provide forms of steel, wood, or other suitable material of size and strength to resist movement during concrete placement and to retain horizontal and vertical alignment until removal. Use straight forms, free of distortion and defects.

Contractor shall use six inch by six inch six gauge steel wire mesh reinforcement which shall be lifted during the placement of concrete to ensure that it is not touching the ground or protruding out of the concrete.

Contractor shall place a 5/8" rebar continuous around the entire perimeter (each side) of the area poured which shall be suspended for concrete placement within the concrete turn-down.

Coat forms with a non-staining form release agent that will not discolor or deface surface of concrete.

Expansion joint filler shall be pre-molded, non-extruding type, ASTM D-544.

Joint sealer shall be asphalt filler AASHTO M-18 or polyurethane compound ASTM C 920 Type S Class 2 self-leveling grade/type.

Metal keys shall be galvanized steel, 16-gauge tongue and groove joint, with 18 gauge tapered channel type stake pin and dowel holes. Metal keys shall have a removable zip strip for the installation of the joint sealant.

Curing and sealing compound shall conform to TT-C-800, with 30 % solids content minimum.

#### **CONSTRUCTION PROCEDURE**

The Contractor shall meet with the University representative to confirm the location of the new paving and to discuss items such as location of joints, grades, site drainage and pedestrian and vehicular controls before the construction begins.

Contractor shall demolish and remove certain portions of existing paving/sidewalks/parking where demolition is indicated in plans and specs.

The Contractor shall break out, remove, and properly dispose of existing concrete to the limits designated in the plans.

The Contractor shall saw cut existing concrete as indicated in plans to ensure straight, clean joints between existing sidewalks and new concrete.

**Contractor shall drill and dowel existing concrete where it meets with new concrete 12" on center.**

**The Contractor shall install an expansion joint material where the new concrete joins the existing concrete.**

Contractor shall check for unstable areas and report them to the University representative prior to placing forms.

Set forms to required lines and grades, rigidly braced and secured. Install sufficient quantity of forms to allow continuous progress of work and so that forms can remain in place at least 24 hours after concrete placement.

Check completed form work for grade and alignment. Flat work shall be true to plane 1/8 inch in 10 feet.

Clean forms after each use, and coat with form release agent as often as required to ensure separation from concrete without damage.

Do not place concrete until forms have been checked for line and grade. Moisten sub-base if required to provide a uniform dampened condition at time concrete is placed.

Contractor shall place concrete around existing manholes, catch basins or other structures. This shall be

considered in placement and elevation of form work to allow for a smooth uniform finish.

Place concrete using methods which prevent dislocation of dowels and joint devices.

Deposit and spread concrete in a continuous operation between transverse joints, as far as possible. If interrupted for more than 1/2 hour, place a construction joint.

Construct expansion, and construction joints, true-to-line with face perpendicular to surface of concrete.

Construct transverse joints at right angles to the centerline, unless otherwise directed.

When joining to existing concrete, place transverse joints to align with previously placed joints, unless otherwise directed.

Construction joints (CJ) shall utilize standard metal keyway-section forms.

Construction joints shall be located as drawn.

Expansion joints (EJ) shall utilize pre-molded joint filler removable caps for expansion joints abutting catch basins, manholes, inlets, structures, walks and other fixed objects for the installation of joint sealer.

Expansion joints shall be located at 50-foot intervals or shall match existing expansion joint locations and at locations where new concrete meets existing concrete.

Where load transfer-slip dowel devices are used at tie in to existing concrete, install so that one end of each dowel bar is free to move.

Extend joint fillers full-width and depth of joint, and not less than 1/2 " or more than 1" below finished surface where joint sealer is indicated.

Protect top edge of joint filler during concrete placement with a metal cap or other temporary material. Remove protection after concrete has been placed on both sides of joints.

After striking-off and consolidating concrete, smooth surface by screeding and floating. Use hand method only where mechanical floating is not possible. Adjust floating to compact surface and produce uniform texture.

After floating, test surface for trueness with a 10 ' straightedge. Distribute concrete as required to remove surface irregularities, and refloat repaired areas to provide a continuous smooth finish.

Work edges of slabs, and formed joints with an edging tool, and round to 1/2" radius, unless otherwise indicated. Eliminate tool marks on concrete surface.

After completion of floating and troweling when excess moisture or surface sheen has disappeared, complete surface finishing by drawing a fine-hair broom across concrete surface, perpendicular to line of traffic. Repeat operation if required to provide a line texture acceptable to the University.

Do not remove forms for 24 hours after concrete has been placed. After form removal, clean ends of joints and point-up any minor honeycombed areas. Remove and replace areas of sections with major defects, as directed by the University.

Protect and cure finished concrete paving. Use curing and sealing compound or moist-curing methods. Protect concrete from damage until acceptance of work. Immediately after initial set of concrete, the Contractor shall cover the new sidewalk or drive with plastic sheeting and shall barricade the sidewalk so that passersby cannot deface the concrete. The Contractor shall be responsible for repairing any defaced concrete at his own cost.

## **BARRICADES AND WARNING SIGNS**

The Contractor shall be responsible for erecting and maintaining adequate barricades and warning signs at each work location. These barricades and warning signs shall include, but not be limited to, barricades, streamers, plastic fencing etc. Pedestrian traffic shall be given a safe route around the work area. Some existing walks and parking areas will require temporary closure. Coordinate closure and temporary fencing with the University. Contractor shall maintain alternate traffic (pedestrian and vehicle) paths during demolition and construction. Where routes are permitted to be closed, provide alternate routes and coordinate with the University prior to rerouting.

## **PRESERVATION OF EXISTING SURFACES**

Contractor shall take whatever precautions necessary to prevent physical, chemical, or permanent visible damage to existing concrete parking, trees and vegetation, curbing, fencing, gates etc. in the performance of this project. Existing trees and their root structures that are in the construction area shall be protected to the maximum extent by

fencing off to the drip line and Contractor shall not allow any material or spoils storage within protected areas, and shall not allow parking of vehicles on grass or in protected areas.

#### **REMOVAL DISPOSAL**

Remove the existing grass, soil, and sub-base at the work area to a depth sufficient to allow placement of the new concrete slab.

Excess soils shall be offered to the University and if declined shall be disposed of off of University property.

Properly dispose of dirt, concrete, trash and debris off site.

Contractor shall provide collection bags for concrete from truck wash outs and over pour, which shall be removed and properly disposed of University property.

#### **SUBGRADE**

Subgrade soils shall be inspected (not tested) for compaction.

**Excavation shall be made to the required depth and width to permit placement of concrete and a turn down along the entire perimeter and as necessary to perform the work under this contract.**

All soft and yielding material shall be removed and replaced with approved material, compacted and graded at contractor's expense.

#### **EXPANSION JOINTS (EJ)**

Contractor shall use as expansion joint, clear heart redwood or ½" fiber board held down 3/8" below finish elevation or a zip strip cap to allow for paving sealant.

Number 4 (1/2") smooth steel dowels 24" in length shall be spaced 12" apart and placed perpendicular to the expansion joint. The dowels shall be secured in place with one side set in expansion tubes.

#### **CONCRETE**

Portland cement concrete pavement shall be straight cement with no additives.

Contractor may use Class A concrete, with a minimum of 5.0 bags of Portland cement per cubic yard and must reach 3500 psi compressive strength in 28 days. No fly ash shall be used.

Concrete Testing Service: Owner may employ and pay for testing laboratory.

Use one brand of cement throughout project, unless otherwise acceptable to University Representative.

#### **REBAR REINFORCEMENT**

All rebar shall be as shown in details provided on plans and all rebar shall be preformed according to the details.

#### **CONCRETE PLACEMENT**

The base shall be moistened prior to placement of concrete but not to the point of creating pools of water or mud.

Concrete shall be placed so as to avoid re-handling and continuous between joints. Intermediate bulkheads will not be allowed. Concrete shall be screeded as soon as it is placed and screeding shall be repeated until the surface is uniform in texture, and true to grade and cross section.

Floating with a machine float will be required to provide the final smooth surface.

#### **CURING MATERIALS**

Liquid membrane-forming compounds shall conform to AASHTO M 148 and be an approved product listed on the DOTD Qualified Products List and shall be either Type 2 white-pigmented or Type 1-D, clear or translucent with a fugitive dye, as specified.

#### **JOINT SEALANT**

The contractor may use any of the poured joint sealers in Section 1005.02 of the DOTD Standard Specifications for Roads and Bridges.

#### **BLOCK SEALERS**

Contractor shall pressure wash new Block walls and apply (2) heavy coats of Therocoat Cementous Coating.

Color selected by the University.

**ROOFING REPAIR MATERIALS**



**SBS Heat-Weld  
Specifications  
3FBD-HW**

Three-Ply Heat-Welded, Base Sheet Fastened Modified Bitumen Mineral-Surfaced Roofing System. For use over Johns Manville (JM) insulation, approved substrate or other approved insulations on inclines up to 6" per ft (500 mm/m).  
Materials per 100 ft<sup>2</sup> (9.29 m<sup>2</sup>) of roof area

Base Ply:	1
DynaWeld Base or PermaPly 28	layer
Intermediate Plies:	1
DynaWeld Base	layer
Cap Sheet Options:	1
DynaWeld Cap FR or DynaClad*	layer

\* DynaClad cannot be used for a membrane on any roof that will have significant foot traffic.  
Approximate installed weight: 185 - 270 lb (84 - 122 kg).

**General**

This specification is for use over any type of approved structural deck with insulation or approved substrate which is suitable to receive a mechanical fastener and which provides an acceptable surface to receive the roof. Specific written approval is required for any roof insulation that is not supplied by JM. Insulation shall be installed in accordance with the appropriate JM insulation specification detailed in the JM Commercial/ Industrial Roofing Systems Manual. This specification can also be used in certain re-roofing situations. Refer to the "Re-roofing" section of the JM Commercial/Industrial Roofing Systems Manual. This specification is not to be used over gypsum, either poured or precast, or lightweight insulating concrete decks or fills.

**Design and installation of the deck and/or roof substrate must result in the roof draining freely, to outlets numerous enough and so located as to remove water promptly and completely. Areas where water ponds for more than 24 hours are unacceptable and will not be eligible for a JM Peak Advantage Guarantee.**

**Flashings**

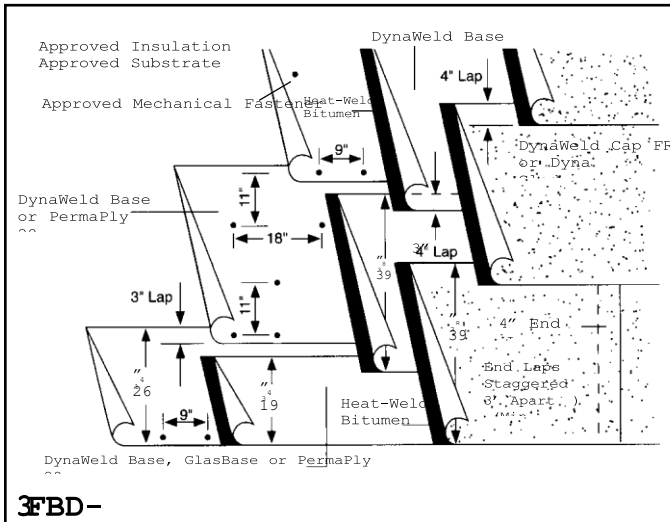
Flashing details can be found in Section 3 of the JM Commercial/Industrial Roofing Systems Manual.

**Application**

Using one of the base plies listed, mechanically fasten with an approved JM insulation fastener and plate, a 26¼" (665 mm) wide piece of base ply through the insulation. The remaining base plies are to be applied full width with 3" (76 mm) side and 4" (102 mm) end laps over the preceding sheets. Fasten the laps at 9" (229 mm) centers, and down the longitudinal center of each felt ply, place two rows of fasteners, with the rows spaced approximately 11" (279 mm) apart, and fasteners staggered on approximately 18" (457 mm) centers. Use fasteners appropriate to the insulation and deck. For additional fastener information, refer to the "Roof Decks" section of the current JM Commercial/Industrial Roofing Systems Manual.

Over the fastened base ply, heat weld a 19¾" (500 mm) piece of one of the intermediate plies listed with a 3" (76 mm) side and 4" (102 mm) end laps. The remaining plies are to be applied full width, in the same manner, with 3" (76 mm) side and 4" (102 mm) end laps over the preceding sheet.

Over the existing two plies, heat weld a full width piece of one of the cap sheets listed. Subsequent sheets are to be applied in the same manner, with a 4" (102 mm) side and 4" (102 mm) end laps over the preceding sheets.



Apply all sheets so that they are firmly and uniformly set, without voids. Using a propane torch, apply the flame to the surface of the coiled portion of the roll. Torch across the full width of the roll and along the lap area. As the surface is heated, it will develop a sheen and the burnoff will disappear. The generation of smoke is an indication that the material is being overheated. Repeat the operation with subsequent rolls, maintaining proper side laps and end laps. A healthy compound flow will simplify seaming the laps. This is done by keeping the flame directed at the adhered ply and in front of the roll. At the end laps, soften the bitumen by heating the granule surface with the torch. When the granules start to sink into the bitumen, stop torching and with a hot trowel, embed the granules into the bitumen. All laps must be checked for good adhesion.

For special precautions for heat weld application see Paragraph 31.0 of Section 3d of the JM Commercial/Industrial Roofing Systems Manual.

For cold weather application techniques, refer to Paragraph 24.0 of Section 3d of the JM Commercial/Industrial Roofing Systems Manual.

### Steep Slope Requirements

Special procedures are required on inclines over 1½" per ft (125 mm/m). Refer to Paragraph 21.0 of Section 3d of the JM Commercial/Industrial Roofing Systems Manual.

### Surfacing

No additional surfacing is required.

**Note:** When using metric- and English-sized sheets in the same system, care should be taken to avoid lap overlap configurations.

Refer to the Material Safety Data Sheet and product label prior to using this product. RS-4247 6-10 (Replaces 12-08)

### MECHANICAL GENERAL PROVISIONS

#### RELATED DOCUMENTS:

The general provisions of the Contract, including the Conditions of the Contract (General, Supplementary, and other Conditions) as appropriate, apply to the Work specified in this Section.

Refer to other sections of the specifications for the other various trades and materials and be thoroughly familiar with all provisions regarding mechanical work.

#### SCOPE OF WORK:

Furnish all labor and material necessary to provide and install the complete mechanical portion of this Contract, including Plumbing, Sprinkler, Air Conditioning, Heating and Ventilating Systems as called for herein and on

accompanying drawings. Parts of the mechanical division may be bid separately or in combination, at the Contractor's option; however, it shall be the responsibility of the Prime Contractor to assure himself that all items covered in the Mechanical Division have been included if he chooses to accept separate bids.

It is the intent of this specification that all materials with temperatures below ambient conditions or conveying any fluid/gas at temperatures below 70 deg. F be insulated to eliminate the potential for condensation. Unless specified elsewhere in these specifications, for materials that do not require access, insulate with 2.33" thick 3/4# density fiberglass duct wrap insulation with foil face (seal all joints air and watertight). For materials requiring occasional access, use 2" thick closed cell rubberized insulation with re-sealable fabric joints (hook and loop type).

Contractor shall install equipment, piping, etc. to meet building and space requirements. No equipment shall be bid on or submitted for approval if it will not fit in the space provided.

It is the intention of these specifications that all mechanical systems shall be furnished complete with all necessary valves, controls, insulation, piping devices, equipment, etc. necessary to provide a satisfactory installation that is complete and in good working order. The HVAC system shall ensure that under all circumstances, the building shall be kept at a and an indoor space relative humidity that when compared to the outside temperature and the relative humidity to protect building finishes installed under this contract and/or existing floor, wall and ceiling finishes within the building from damage due to excessive temperature or humidity. HVAC system shall ensure that building remain under a slight positive pressure and shall alarm in the event of a negative pressure condition. In addition Contractor shall provide training to Owner in regard to the need for space temperature and humidity control whenever the outdoor dew point (wet-bulb temperature) exceed 62.5 deg. F and freeze protection procedures whenever the outdoor temperature (dry-bulb temperature) drops below 32 deg. F. Contractor shall obtain written sign-off on the part of the Owner to the receipt of all training including the above and all required training referenced hereafter, throughout these specifications. Failure to obtain this sign-off shall be constructed as evidence that proper training was not given.

Contractor shall visit the site and acquaint himself thoroughly with all existing facilities and conditions which would affect his portion of the work. Failure to do so shall not relieve the Contractor from the responsibility of installing his work to meet the conditions.

This Contractor shall protect the entire system and all parts thereof from injury throughout the project and up to acceptance of the work. Failure to do so shall be sufficient cause for the General Contractor/Engineer to reject any piece of equipment.

#### DEMOLITION

The contractor shall visit the site prior to bid to determine the extent of work required to complete the project.

Contractor shall coordinate demolition with owner. All equipment shall be salvaged for owner. Locate equipment as directed by owner. All equipment and materials not salvaged by the owner shall be removed from the site and discarded at the contractor's expense.

Contractor shall coordinate all work with Prime Bidder and phase work as required by project.

All equipment piping, etc. required to be removed to accommodate the modifications shall be removed.

Contractor shall maintain services to existing facilities which shall remain during and after construction is complete.

Contractor shall coordinate any shutdown of services with the owner. It is intended that the building will remain occupied during construction. Contractor shall schedule shut down of services with the owner in order to prevent disruption of building occupancy.

Contractor shall be responsible for draining down of existing systems to complete demolition. All work shall be scheduled with the owner. Contractor shall also be responsible for refilling system and removing all air in order to return the systems to proper operating conditions.

All shutdown of services shall be done at a time approved by owner. The systems shall be required to be back up and running each morning unless otherwise approved by the owner.



**GROUND AND CHASES:**

This Contractor shall see that all required chases, grounds, holes and accessories necessary for the installation of his work are properly built in as the work progresses; otherwise, he shall bear the cost of providing them.

**CUTTING AND PATCHING:**

Initial cutting and patching shall be the responsibility of the Prime Bidder, with the Mechanical Contractor being responsible for laying out and marking all holes required for the reception of his work. No structural beams or joists shall be cut or thimble without first receiving the approval of the Architect. After initial surfacing has been done, any further cutting, patching, and painting shall be done at this Contractor's expense.

**FILL AND CHARGES FOR EQUIPMENT:**

Fill and charge with materials or chemicals all those devices or equipment as required to comply with the manufacturer's guarantee or as required for proper operation of the equipment.

**BIDDING REQUIREMENTS AND RESPONSIBILITIES:**

Prime bidder is responsible for all work, of all trades and sub-contractors bidding this project. It is the prime bidder's responsibility, prior to submitting a bid to ensure that sub-contractors coordinate all aspects of the work between trades, sub-contractors, etc. to the fullest extent possible.

Prime bidder shall ensure that all sub-contractors, suppliers, equipment vendors, etc., obtain all necessary and pertinent contract document information pertaining to their work prior to the submission of a bid. Contractor shall realize that different sub-contractors may furnish equipment, accessories, devices, etc. necessary for a complete and working installation, that require provision of services by another sub-contractor or trade.

Bidders of all or any portions of this section are required to review all contract documents including but not limited to Architectural drawings, Mechanical drawings, Plumbing drawings, Electrical drawings, etc. to coordinate requirements and responsibilities with and through prime bidder.

Bidders of all or any portions of this section, by furnishing a bid on a portion of the prime contract are indicating that they have received all contract documents and coordinated services provided under their portion of the work with the prime bidder; they are indicating that they have expressed any pertinent questions (which would result from a detailed, thorough review of the entire set of contract documents) to the prime bidder in accordance with the specifications prior to bidding.

All timely, pertinent, questions provided in writing prior to bids, in accordance with specification requirements, will be clarified, defined, or otherwise explained in a written addendum and/or addendums prior to bid.

It is not the intention of these contract documents to leave any issue relating to coordination between trades or sub-contractors vaguely defined. The intention is to define all issues, coordination matters, equipment requirements, sizes, routing, etc. to the satisfaction of the prime bidder, prior to receipt of bids.

Bidders of all or any portions of this section, by virtue of the submission of a bid to the prime bidder, are indicating that they have reviewed the entire set of contract documents with due diligence and regard for the Owner's desire for a comprehensive and complete bid proposal; that they have expressed all concerns or questions requiring clarification on matters of coordination between trades and/or sub-contractors; that they have expressed any such concerns or questions in writing in accordance the specification requirements.

Prime bidders, by submission of a comprehensive bid on the project are indicating that the subcontractors selected in their bid have complied with all specification requirements, that they have indicated in writing, prior to bidding, all questions or concerns requiring clarification and/or explanation and have documented any and all specific exclusions involving work that would generally be considered to be work of their trade. The prime bidder shall coordinate all work so that anything excluded by the bidder of all or any portions of this section or division, have been addressed prior to bids in one of the following manners:

The work has been confirmed, by the prime bidder, to be work of another trade or subcontractor (whose proposal is also being accepted).

Clarification of the matter has been made through the prime design professional via written addendum and is clearly and mutually understood by the prime bidder and the party raising the issue/question, or seeking clarification.

The work has been accepted as the responsibility of the prime contractor directly. MATERIAL AND

#### EQUIPMENT:

The term "provide" when used in the Contract Documents includes all items necessary for the proper execution and completion of the Work.

Specific reference in the Specifications to any article, device, product, material, fixture, form or type of construction by name, make or catalog number, shall be interpreted as establishing a standard of quality and shall not be construed as limiting competition; and the Contractor, in such cases, may at his option use any article, device, product, material, fixture, form or type of construction which in the judgement of the Contractor/Owner expressed in writing is equal to that specified.

Coordinate and properly relate all Work of this section to building structure and work of all other trades.

Visit premises and become thoroughly familiar with existing conditions; verify all dimensions in field. Advise Contractor of any discrepancies prior to Bid Date.

Do not rough-in for any item or equipment furnished by others or noted "Not in Contract" (NIC), without first receiving rough-in information from physically examining the existing equipment, receiving specific cut sheet information from the Owner's representative, other trades and/or Contractor. Rough-in services for "NIC" equipment as required, as the work progresses.

Provide storage and protection for all equipment and materials. Replace any equipment and materials damaged by improper handling, storage, or protection, at no additional cost to Owner.

Keep premises clean in accordance with requirements of the specifications. SUBSTITUTIONS:

Substitutions are only allowed by approval of the Contractor/Owner prior to Bid Date as stipulated in the specifications.

Design of systems is based on specific equipment. If the use of other manufacturer's equipment, even though approved by Contractor/Owner, involves additional cost due to space requirements, foundation requirements, increased mechanical or electrical services, the cost of such extra work shall be borne by manufacturer of substituted equipment. Even though a manufacturer's name appears in the Contract Documents as having acceptable equipment, their equipment with different model numbers shall be classified as being a substitute to the equipment originally designed for and named in the Contract Documents. Substitute equipment, materials, etc., will not be allowed to deviate from Contract Document requirements. Furnish all options specified or reasonably implied from the contract documents. Specifically identify any variance in regard to submittal versus specified performance on the cover sheet of each submittal.

#### DRAWINGS AND SPECIFICATIONS:

The specific intent of these Contract Documents is to provide the various systems, equipment, etc. to the Owner complete and in a thoroughly calibrated functional condition.

The Drawings shall not be construed as shop drawings. In the event of a possible interference with piping or equipment of another trade, items requiring set grade and elevations shall have precedence over other items. Should any major interference develop, immediately notify the Contractor/Owner.

In laying out Work, refer to mechanical, electrical, structural, and architectural drawings at all times in order to avoid interference and undue delays in the progress of the Work.

Furnish all plumbing fixtures (with required accessories) shown on the drawings. Review casework elevations and identify fixtures indicated. Provide fixtures indicated. Rough-in for all fixtures as work progresses. Verify prior to fixture shop drawing submittal.

In the event of a conflict between drawings and specifications, the more stringent interpretation shall govern.

**CODES AND REGULATIONS:**

Work shall be in full accord with the most stringent interpretation of the State Sanitary Code, local ordinances, building codes, and other applicable national, local, and state regulations.

Equipment shall conform to requirements and recommendations of the National bureau of Fire Underwriters and National Fire Protection Association (NFPA).

Items provided under this specification shall comply with the American National Standards Institute (ANSI) "Specifications for Making Buildings and Facilities Accessible to and Usable by Physically Handicapped People," ANSI A 117.1

In the possible event of conflict between codes or regulations, and Contract Documents, the most stringent interpretation of either shall govern (provided it exceeds the requirements of other codes. In the event of an irreconcilable difference between codes or regulations notify the Contractor/Owner immediately.

In addition to the codes heretofore mentioned, all mechanical work and equipment shall conform to the applicable portions of the following specifications, codes and/or regulations:

American Society of Heating, Refrigeration and Air Conditioning Engineers (ASHRAE) National Electrical Code (NEC)  
 National Fire Protection Association (NFPA) Universal Fire Code (UFC)  
 Universal Plumbing Code (UPC) International Mechanical Code (IMC)  
 American Society of Mechanical Engineers (ASME) International Fuel Gas Code (IFGC)  
 International Building Code (IBC) International Plumbing Code (IPC) Underwriters Laboratories (UL)  
 Accessibility Code ADAAG (ND Century Code, State Building Code) Energy Code (MEC)

All materials, equipment and accessories installed under this Contract shall conform to all rules, codes, etc. as recommended by National Associations governing the manufacturer, rating and testing of such materials, equipment and accessories. All materials shall be new and of the best quality and first class in every respect. Whenever directed by the Contractor/Owner, the Contractor shall submit a sample for approval before proceeding.

Where laws or local regulations provide that certain accessories, such as gauges, thermometers, relief valves and parts be installed on equipment, it shall be understood that such equipment be furnished complete with the necessary accessories, whether or not called for in these Specifications.

All unfired and fired pressure vessels shall be built in accordance with the A.S.M.E. Code and so stamped. Furnish shop certificates for each vessel. Contractor shall provide and pay for first operating certificate as per State Fire Marshal Regulations.

**FEES, PERMITS, AND TAXES:**

Obtain and pay for permits required for the Work of this Specification. Pay fees in connection therewith, including necessary inspection fees.

Pay any and all taxes levied for Work of this specification, including municipal and/or state sales tax where applicable.

All permits, fees, certificates, etc. for the installation, inspections, plan review, service connections locations, and/or construction of the work which are required by any authority and/or agencies having jurisdiction, shall be obtained and paid for by the Contractor.

The Contractor shall make all tests required by the Contractor/Owner, or other governing authorities at no additional cost to the Owner.

The Contractor shall notify the Contractor/Owner and local governing authorities before any tests are made, and the tests are not to be drawn off a line covered or insulated until examined and approved by the authorities. In event defects are found, these shall be corrected and the work shall be retested.

Prior to requesting final inspection by the Contractor/Owner, the Contractor shall have a complete coordination and adjustment meeting of all of his sub-contractors directly responsible for the operation of any portion of the system. At the time of this meeting, each and every sequence of operation shall be checked to assure proper operation. Notify the Contractor in writing ten (10) days prior to this meeting, instructing him of the time, date and whom you are requesting to be present.

This project shall not be accepted until the above provisions are met to the satisfaction of the Contractor.

#### MANUFACTURER'S DIRECTIONS:

Install and operate equipment and material in strict accord with manufacturer's installation and operating instructions. The manufacturer's instructions shall become part of the Contract Documents and shall supplement Drawings and Specifications.

#### SUBMITTAL DATA:

Submit shop drawings, project data, and samples in accordance with requirements of the specifications.

Shop drawings shall consist of published ratings or capacity data, detailed construction drawings for fabricated items, wiring and control diagrams, performance curves, installation instructions, manufacturer's installation drawings, and other pertinent data. Submit drawings showing revisions to equipment layouts due to use of alternate or substitute equipment.

Where approved manufacturers and suppliers of equipment, materials, etc. are unable to fully comply with Contract Document requirements, specifically call such deviations to attention of Contractor on submittals. Type deviations on a separate sheet; underlined statements or notations on standard brochures, equipment fly sheets, etc. will not be accepted.

Approval of submittals shall not relieve Contractor from furnishing required quantities and verifying dimensions. In addition, approval shall not waive original intent of Contract Documents.

Failure to obtain written approval of equipment shall be considered sufficient grounds for rejection of said equipment regardless of the stage of completion of the project.

#### REVIEW OF MATERIALS:

Whenever manufacturers or trade names are mentioned in these Plans or Specifications, the words "or approved equivalent" shall be assumed to follow whether or not so stated. Manufacturers or trade names are used to establish a standard of quality only and should not be construed to infer a preference. Equivalent products which meet the Contractor/Owner's approval will be accepted; however, these products must be submitted to the Contractor a minimum of ten (10) days prior to the Bid Date.

Submission shall include the manufacturer's name, model number, rating table and construction features.

Upon receipt and checking of this submittal, the Owner will issue an addendum listing items which are approved as equivalent to those specified. THE CONTRACTOR SHALL BASE HIS BID SOLELY ON THOSE ITEMS SPECIFIED OR INCLUDED IN THE "PRIOR APPROVAL ADDENDUM", AS NO OTHER ITEM WILL BE ACCEPTABLE.

Prior approval of a particular piece of equipment does not mean automatic final acceptance and will not relieve the Contractor of the responsibility of assuring himself that this equipment is in complete accord with the Plans and Specifications and that it will fit into the space provided. Shop drawings must be submitted on all items of equipment for approval as hereinafter specified.

Before proceeding with work and/or within thirty (30) days after the award of the Contract for this work, the Mechanical Contractor shall furnish to the Contractor complete shop and working drawings of such apparatus, equipment, controls,

insulation, etc. to be provided in this project. These drawings shall give dimensions, weights, mounting data, performance curves and other pertinent information.

The Contractor/Owner's approval of shop drawings shall not relieve the Contractor from the responsibility of incorrectly figured dimensions or any other errors which may be contained in these drawings. Any omission from the shop drawings or specifications, even through approved by the Contractor/Owner, shall not relieve the Contractor from furnishing and erecting same.

Seven (7) sets of shop drawings shall be submitted to the Contractor for approval. These submittals shall be supplied as part of this Contractor's contract. Any drawings not approved shall be resubmitted until they are approved. **SUBMIT ALL SHOP DRAWINGS AT THE SAME TIME. NO SEPARATE ITEMS WILL BE ACCEPTED.**

#### PROJECT RECORD DOCUMENTS:

Keep Project Record Documents in accordance with requirements of the specifications.

During construction period, keep accurate records of installations made under this section, paying particular attention to major interior and exterior underground and concealed piping, ductwork, etc.

The Contractor shall obtain at his cost, two sets of blueline prints of the original bid documents by the Contractor. One set shall be kept on the site with all information as referenced below, and shall update same as the work progresses. The other set will be utilized to record all field changes to a permanent record copy for the Owner.

If the Contractor elects to vary from the Contract Documents and secures prior approval from the Contractor for any phase of the work, he shall record in a neat and readable manner, ALL such variances on the blueline print in red. The original bluelines shall be returned to the Contractor for documentation.

All deviations from sizes, locations, and from all other features of the installations shown in the Contract Documents shall be recorded.

In addition, it shall be possible using these drawings to correctly and easily locate, identify and establish sizes of all piping, directions and the like, as well as other features of the work which will be concealed underground and/or in the finished building.

Locations of underground work shall be established by dimensions to columns, lines or walls, locating all turns, etc., and by properly referenced centerline or invert elevations and rates of fall.

For work concealed in the building, sufficient information shall be given so it can be located with reasonable accuracy and ease. In some cases this may be by dimension. In others, it may be sufficient to illustrate the work on the drawings in relation to the spaces in the building near which it was actually installed. The Contractor's/Owner's decision in this matter will be final.

The following requirements apply to all "As-Built" drawings: They shall be

maintained at the Contractor's expense.

All such drawings shall be done carefully and neatly, and in a form approved by the Contractor/Owner. Additional drawings shall be provided as necessary for clarifications.

These drawings shall be kept up-to-date during the entire course of the work and shall be available upon request for examination by the Contractor/Owner; and when necessary, to establish clearances for other parts of the work.

"As-built" drawings shall be returned to the Contractor upon completion of the work and are subject to approval of the Contractor/Owner.

#### CUTTING AND PATCHING AND SEALING OF PENETRATIONS:

Comply with requirements of the specifications regarding cutting and patching. Locate and timely install sleeves as required to minimize cutting and patching.

Cutting, fitting, repairing, patching, and finishing of Work shall be done by craftsmen skilled in their respective trades. Where cutting is required, cut in such a manner as not to weaken structure, partitions, or floors. Holes required to be cut must be cut or drilled without breaking out around the holes. Where patching is necessary in finished areas of the building, the Owner will determine the extent of such patching and refinishing.

Where return air plenums above ceilings are utilized, Contractor shall ensure that return air openings are provided in walls run to deck, for proper return air flow back to the AHU. Cut walls as required to provide openings sized for maximum 1000 feet per minute air flow velocity through openings above ceiling. Provide a fire damper at openings of fire walls and a smoke damper at openings of smoke walls. Coordinate electric or pneumatic services to smoke dampers via automatic temperature control/EMS Contractor.

Repairing Roadways and Walks: Coordinate all roadway work with authorities having jurisdiction. Cut and/or bore under roadways for connection of utilities as required. Coordinate work through Prime Bidder. Where this contractor cuts or breaks roadways or walks to lay the piping, he shall repair or replace these sections to match existing, unless specifically identified as the responsibility of others.

#### PAINTING:

Painting shall be provided by Prime Bidder's painting sub-contractor, unless specified otherwise. Leave exposed piping, materials, and equipment clean and free of rust, grease, dirt, etc. before and after painting.

Factory finished equipment, fixtures, and materials which are marred, chipped, scratched, or otherwise unacceptable shall be repaired or replaced under this section to Owner's satisfaction, at no additions cost to Owner.

Coordinate all painting requirements with prime bidder prior to bids.

#### CLEANING AND ADJUSTING:

Upon completion of his work, the Contractor shall clean and adjust all equipment, controls, valves, etc.; clean all piping, ductwork, etc.; and leave the entire installation in good working order.

#### OPERATING AND MAINTENANCE INSTRUCTIONS:

Provide the Owner with three (3) copies of printed instructions indicating various pieces of equipment by name and model number, complete with parts lists, maintenance and repair instructions and test and balance report.

#### COPIES OF SHOP DRAWINGS WILL NOT BE ACCEPTABLE AS OPERATION AND MAINTENANCE INSTRUCTIONS.

This information shall be bound in plastic hardbound notebooks with the job name, Contractor and Owner names permanently embossed on the cover. Rigid board dividers with labeled tabs shall be provided for different pieces of equipment. Submit manuals to the Contractor for approval.

In addition to the operation and maintenance brochure, the Contractor shall provide a separate brochure which shall include registered warranty certificates on all equipment, especially any pieces of equipment which carry warranties exceeding one (1) year.

The operation and maintenance brochure shall be furnished with a detailed list of all equipment furnished to the project, including the serial number and all pertinent nameplate data such as voltage, amperage draw, recommended fuse size, rpm, etc. The Contractor shall include this data on each piece of equipment furnished under this contract.

#### GUARANTEE:

The Contractor shall guarantee all materials, equipment and workmanship for a period of one (1) year from the date of final acceptance of the project. This guarantee shall include furnishing of all labor and material necessary to make any repairs, adjustments or replacement of any equipment, parts, etc. necessary to restore the project to first class condition. This guarantee shall exclude only the changing or cleaning of filters. Warranties exceeding one (1) year are hereinafter specified with individual pieces of equipment.

If the Contractor's office is in excess of a fifty (50) mile radius of the project, he shall appoint a local qualified contractor to perform any emergency repairs or adjustments required during the guarantee period. The name of the contractor appointed to provide emergency services shall be submitted to the Prime Contractor for his approval.

**LOCAL CONDITIONS:**

The location and elevation of all utility services is based on available surveys and utility maps and are reasonably accurate; however, these shall serve as a general guide only, and the Contractor shall visit the site and verify the location and elevation of all services to his satisfaction in order to determine the amount of work required for the execution of the Contract.

In case major changes are required, this fact, together with the reasons therefor, shall be submitted to the Contractor, in writing, not less than seven (7) days before the date of bidding. Failure to comply with this requirement will make the Contractor liable for any changes, additions and expenses necessary for the successful completion of the project.

**MINOR DEVIATIONS:**

Plans and detail sketches are submitted to limit, explain and define conditions, specified requirements, pipe sizes and manner of erecting work. Structural or other conditions may require certain modifications from the manner of installation shown, and such deviations are permissible and shall be made as required. However, specified sizes and requirements necessary for satisfactory operation shall remain unchanged. It may be necessary to shift ducts or pipes, or to change the shape of ducts, and these changes shall be made as required. All such changes shall be referred to the Contractor for approval before proceeding. Extra charges shall not be allowed for these changes.

The Contractor shall realize that the drawings could delve into every step, sequence or operation necessary for the completion of the project, without drawing on the Contractor's experience or ingenuity. However, only typical details are shown on the Plans. In cases where the Contractor is not certain about the method of installation of his work, he shall ask for details. Lack of details will not be an excuse for improper installation.

In general, the drawings are diagrammatic, and the Contractor shall install his work in a manner so that interferences between the various trades are avoided. In cases where interferences do occur, the Contractor is to state which item was first installed.

**LABELING MECHANICAL EQUIPMENT:**

All Plumbing Piping Systems and Mechanical Equipment (A/C units, air handlers, fans, etc.) furnished under this section of the contract documents shall be labeled with permanent laminated plate secured to equipment. Units shall be labeled as indicated on plans and schedules.

**BASIC MATERIALS AND METHODS****PIPE:**Equipment Emergency Drain Pan Lines:

These shall be Government Type "L" hard copper.

Refrigerant Lines:

These shall be Government Type "L" hard copper.

Condensate Drain Lines:

Piping shall be constructed of American Made **solid wall** Schedule 40 PVC "DWV" plastic pipe and fittings with solvent welded joints as manufactured by Charlotte Pipe and Foundry or J M Manufacturing. All piping shall conform to ASTM D 1784, all fittings shall conform to ASTM D 2665, and solvent cement joints shall be made in a two (2) step process with colored primer and cement conforming to ASTM D 2564. All piping components shall be NSF Standard 14. Cellular foam core piping will not be considered for use.

Externally insulate piping with 2" thick fiberglass insulation with foil back vapor barrier. All seams and joints shall be properly sealed to avoid any air infiltration.

Domestic Cold and Hot Water Lines:

All such lines shall be Government Type "L", hard copper water tubing of standard weight and thickness as made by Mueller, Chase, Anaconda or equivalent, unless indicted otherwise. Use 95-5 lead-free solder on all piping above slab.

Use Silfos 1000<sup>0</sup> lead-free solder on all piping beneath the slab.

Domestic cold water lines penetrating concrete slabs shall be wrapped with "Protect-O-Sleeve" vinyl flexible tube as manufactured by Robert H. Harris Co., or equivalent.

Domestic hot water lines shall be insulated at all penetrations through slab per insulation (see Insulation Section).

Sanitary Sewer Waste and Vent Piping:

Piping shall be constructed of American Made **solid wall** Schedule 40 PVC "DWV" plastic pipe and fittings with solvent welded joints as manufactured by Charlotte Pipe and Foundry or J M Manufacturing . All piping shall conform to ASTM D 1784, all fittings shall conform to ASTM D 2665, and solvent cement joints shall be made in a two (2) step process with colored primer and cement conforming to ASTM D 2564. All piping components shall be NSF Standard 14. Cellular foam core piping will not be considered for use.

COMPRESSED GAS PIPING SYSTEMS:

METHANE (M), HYDROGEN (H), and CARBON DIOXIDE (CO2) PIPING:

Piping shall be 316 series stainless steel tubing conforming to ASTM A270 (Standard Specification for Seamless and Welded Austenitic Stainless Steel Sanitary Tubing). Fittings shall be welded and comply with ASTM B31.3. At Contractor's option, fittings may be "Swagelok" type mechanical fittings.

COMPRESSED AIR (A) AND NITROGEN (N) PIPING:

Piping shall be Type Hard Drawn "L" copper tubing conforming to American Society for Testing and Materials (ASTM) B-819, "SPECIALLY CLEANED AND CAPPED" for medical service. Brazing filler material shall be selected on the basis of American Welding Society (AWS) 5.8 requirements. Brazing filler material to be copper – phosphorus (B cup series) or a silver bag, cadmium free that has a melting temperature in excess of 1,000 Degrees F. Brazing shall be performed in strict accordance with AWS B2.2-91. At Contractor's Option, for threaded joints contractor may use Teflon tape starting on the third thread of the male thread only.

COMPRESSED GAS PIPING SYSTEMS INSTALLATION:

All of the Compressed Gas Piping Systems (Methane, Hydrogen, Nitrogen, Carbon Dioxide, and Air) shall be continuously purged to and during all assembly, fitting, and brazing operations with dry Nitrogen to prevent the formation of scale or the intrusion of ambient air within tubing. The flow rate shall be 15-25 CFM during brazing. Prior to brazing, check the open end of the purged tube with an Oxygen Analyzer. Verify proper purge flow and the absence of oxygen in the purged gas. Braze the joint nearest the supply end of the purge, working your way toward the exit end of the purge. Use vinyl (electricians) tape to temporary seal of joints that have not been brazed. Purge gas is to continue until all brazed joints and piping has reached or brazing is stopped. Installer shall recap and/or tape all openings in the system leaving nitrogen present to prevent ambient contamination.

Piping shall be cut with tubing cutter with sharp well, square and true to size. Hack saws or similar cutting tools are not allowed. All cut ends shall be reamed, cleaned, and restored to original pipe dimensions. Shavings in the piping system shall be cause for rejection of the piping system.

COMPRESSED GAS PIPING SYSTEMS TESTING:

After erection of the piping system, but prior to installation of branch piping to Fume Hoods, the piping system shall be blown clear free moisture and foreign matter by means of cylinder oil-free-and -dry compressed air or nitrogen gas.

The piping system shall be tested under a test pressure of 150 PSI by means of cylinder nitrogen. The test pressure shall be maintained until each joint has been thoroughly examined for leaks by means of soapy water. (A soap solution mixed in the following proportions gives good results: one ounce of water to four ounces of glycerin. Dissolve the soap in the water, add the glycerin and mix thoroughly.) Wipe the joints clean after tests. All leaks shall be repaired, and the piping system retested.

Final Test – A 24-Hour standing pressure test with nitrogen at 150 PSI to check the completeness of previous joint tests. After completion of the final standing pressure test, the system shall be thoroughly flushed with the gas to be used in the system to assure the removal of all nitrogen or air.

Installation of Piping:

All pipe shall be true and straight, without sags or traps.

The Contractor shall exercise care in cleaning joints after making cuts on pipe to prevent pipe particles from entering the system.

All pipe fittings shall be same as piping specified unless indicated otherwise.



Arrange, install piping approximately as indicated, straight, plumb and as direct as possible; form right angles, or parallel lines with building walls. The most practical appearance of piping runs is required. Keep pipes close to walls, partitions, ceilings; off-set only where necessary to follow walls as directed.

Before installing piping, check existing building conditions, make accurate layout of Plumbing and HVAC piping. Where interferences may appear and departures from indicated arrangements are required, consult with other trades involved; come to agreement as to changed locations and elevations of piping; obtain Owner approval of proposed changes. Note runs of other contractor's piping and large conduits and cooperate to achieve neat appearance.

Unless otherwise indicated, conceal all piping in building construction in finished areas. Install such piping in time so as not to cause delay to work of other trades and to allow ample time for tests and approval; do not cover before approval is obtained.

Locate groups of pipes parallel to each other and building lines; space them at distance to permit access for servicing, valves, and to create most practical appearance when racked with conduits, refrigerant, etc., provided by other contractors.

Rigidly support pipes projecting from walls, chases, etc. in wall or chase to make firm, well-braced installation. Loosely supported pipe or accessory is not acceptable.

Install horizontal piping to coordinate with other trades and install without sags or humps.

Keep piping free from scale and dirt, protect open pipe ends wherever work is suspended during construction. To prevent foreign bodies entering and lodging in pipe, use temporary plugs or other approved material.

Where changes in pipe sizes occur, do not bush down; use only reducing fittings. For drainage piping changes in direction, use long-sweep bends where possible; otherwise, short sweep 1/4 bends or combination Y and 1/8 bends; also Y's in combination with other bends.

Provide shut off valves at all supply connections to all equipment. Supplier of equipment shall provide rough-in drawings and this contractor shall fully connect all items, supply necessary piping and fittings as required, unless otherwise noted individually.

Do not locate valves with stems below horizontal.

Locate valves for easy access and operations. Where concealed, notify Owner of exact location in order that he may leave openings for access panels.

Provide unions, screwed or flanged, where indicated, and in following locations even if not indicated..

In connection to equipment requiring disconnection for repairs or replacement. Locate between shut-off and equipment.

#### **RATED WALL OR FLOOR PENETRATIONS:**

Piping penetrating fire rated walls, floors, or ceilings shall be sealed with fire rated sealant in accordance with the manufacturer's recommendations for the specific U.L. Assembly.

#### **PIPE HANGERS AND SUPPORTS:**

This Contractor shall furnish and install all foundations and supports required for his equipment unless indicated otherwise on the Drawings.

This Contractor shall furnish and install all escutcheons, inserts, thimbles, hangers, etc. required for the proper support and installation of his equipment and piping and he shall cooperate with other trades in locating and placing these items.

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This Contractor shall furnish and install all escutcheons, inserts, thimbles, hangers, etc. required for the proper support and installation of his equipment and piping and he shall cooperate with other trades in locating and placing these items.

**PROVIDE SLEEVES FOR ALL PIPES PASSING THROUGH WALLS, FLOORS, BEAMS, ETC.:**

Sleeves passing through structural members or concrete footings shall be of cast iron or Schedule 40 steel pipe. Sleeves passing through nonstructural walls or floors shall be of 26 gauge galvanized iron. Joints between sleeves and pipes passing through floors shall be made weather tight with plastic materials. Where pipes pass through water proofing membrane, flashing sleeves shall be installed.

Provide Grinnell, Fee & Mason, or equivalent malleable iron split ring hangers with rod supports throughout. STRAP HANGERS OR WIRE WILL NOT BE ACCEPTED.

Maximum spacing of hangers for cast iron pipes shall be 5 ft.;

Provide galvanized iron shields between hangers and pipe covering.

All piping projecting from chases shall be rigidly supported in the wall or chase. Loosely supported piping or accessories will not be accepted.

**VALVES AND UNIONS:**

Furnish and install all valves, unions, stops, connections, etc. shown on plans as necessary to make a complete system in working order. Provide valves on inlet and outlet of all equipment and fixtures and on branch lines to fixtures or groups of fixtures.

Ball Valves for domestic hot and cold water, 3" and smaller, rated for 150 PSI saturated steam pressure, 600 PSI WOG pressure; shall be 2-piece construction, bronze body conforming to ASTM B-62, conventional port, chrome-plated brass ball, replaceable TFE seats and seals, blow-out proof stem, and vinyl-covered steel handle. Provide solder ends of Kitz 59/69, Apollo 77C, NIBCO Design S-580-70, Milwaukee BA-150-S, Red & White 5049F or equal, threaded ends of Kitz 58/68, NIBCO Design T-580-70, Milwaukee BA-100-S, Red & White 5044F or equal. For insulated piping systems, provide ball valves with extended stem, insulated handle with protective thermal barrier sleeve to prevent condensate moisture drip and pipe insulation deterioration.

Valves for compressed gas piping (Methane, Hydrogen, and Carbon Dioxide) shall be Swagelok ball and quarter turn valves, three-piece ball valves, 316 stainless steel 60 series type.

**INSTALLATION OF VALVES:**

Use ball valves for shut-off duty.

Locate valves for easy access and provide separate support where necessary.

Install valves and unions for each fixture and item of equipment arranged to allow equipment removal without system shutdown. Unions are not required on flanged devices.

Install valves in horizontal piping with stem at or above the center of the pipe.

Install valves in a position to allow full stem movement.

All valves, unions, etc. where pipe is chrome plated shall have similar finish. All exposed supplies to plumbing fixtures shall be chrome plated.

All valves, on insulated piping shall be complete with extended lever handle stem.

**SHOCK ABSORBERS:**

All water service to fixtures or groups of fixtures shall have concealed air chambers. Air chambers shall be of the same diameter as the supply or header pipes and 12 inches long on both hot and cold water branches. Locate shock absorbers close to fixture or at end of header.

Shock arrestors shall be installed for sterilizer water supplies.

On lines 1-1/4" and above fixtures with quick closing valves (i.e.: Dishwashers, tempered valves, etc.) install "Shock Trol", "Precision Plumbing Products" or equal water Hammer arrester properly sized for each unit.

**ESCUTCHEONS:**

Provide escutcheons for all exposed lines passing through floors, walls, and ceilings. They shall be chrome plated brass and shall be of such flange size as to cover necessary penetrating openings.

**TEST:**

Make such tests of work as specified or required by Contractor or by State and Municipal Bureaus having jurisdiction, and under their supervision. Perform tests in presence of Contractor's representative. Notify Contractor/Owner two days prior to testing.

Provide apparatus, temporary piping connections, or other requirements necessary for tests. Take precautions to prevent damage to building or contents by tests. Contractor is required to repair and make good at his expense damage so caused.

Correct leaks, defects, or deficiencies discovered as result of tests. Repeat tests until test requirements are fully complied with. Caulking of pipe joints to remedy leaks is not permitted.

**PIPE MARKERS:**

Provide pipe markers and directional arrows on all piping exposed, and above ceilings. Markers shall be as manufactured by W.H. Bradley Co., or the equivalent. All letters shall be color-coded and sized as recommended by OSHA. Samples of the type of letters to be used shall be submitted with shop drawings.

The following pipe and valves shall be identified:

	Piping
Compressed Air	X
Methane	X
Hydrogen	X
Nitrogen	X
Carbon Dioxide	X
Refrigerant Piping	X

Pipe markers with arrows shall indicate lines content. Labels shall be located 20 feet on center. Labels shall also be located at each change of direction of line. Identification bands shall be color coded to match pipe markers. Pipe identification markers shall be taped at each end and shall be taped around the entire circumference of pipe.

**MOTORS, MOTOR STARTERS AND ELECTRICAL WORK**

This Contractor shall furnish to the Electrical Contractor for installation, all motor starters, VFD's, start-stop switches, pilot lights, etc., for each piece of motor driven equipment unless shown otherwise.

The Electrical Contractor shall install all motor starters, VFD's, start-stop switches, and pilot lights as furnished by this Contractor. The Electrical Contractor shall also do all power wiring, and electrical terminations required for the installation of such mechanical equipment.

All electrical equipment shall have the UL label and shall meet the standards of the National Electrical Code and NEMA Rated. I.E.C. is not acceptable.

All starters and VFD's shall have "on-off-auto" selector switches, phase failure protection, and interface with building automation controls.

## MOTORS

All motors on equipment shall be "Premium High Efficiency" type motors with copper windings.

Motors shall be of the 40□□ rise type, Class F insulation, NEMA Design B and totally enclosed fan-cooled (TEFC) design as a minimum. All motors shall be wound for plus or minus 10% of the specified voltage.

Motors shall meet the following horsepower ratings, and minimum full load efficiencies (U.S. IEEE 122A):

Motor Hp	Minimum Full Load Efficiency (Nominal)
0-2	84%
3	85%
5	87%
7, 5, 10	89%
15	90%
20	91%
25, 30	92%
40 and above	93%

Motors shall have 1.15 service factor rating for 3-phase motors and 1.35 for single-phase motors.

Motors shall be as manufactured by Century III E-Plus, Marathon Series Premium Blue Chip XRI or approved equivalent.

Motors which are controlled/started by variable frequency drives (Inverters) shall be Inverter Duty Motors. Motors shall be of the totally enclosed fan cooled (TEFC) type with Class F Insulation, ball bearings, Continuous Duty 40j C Ambient, Cast Iron Frame, Class H magnet wire. Motors shall comply with NEMA MG1 Part 30/Part 31 requirements/specifications.

All motors shall be specifically designed for specific application specified (i.e.: AHU, fan, etc.), and shall have built-in thermal overload protection.

The supplier shall provide a list of motors with nameplate data for each new motor submitted. Submit in shop drawings with associated motor efficiency.

## MOTOR STARTERS

Refer to Electrical Plans and provide fusible type combination starter/disconnects where required.

Exception: Manual starters can be furnished for fractional horsepower motors that are not controlled automatically or remotely. Refer to Temperature Controls section of these specifications and mechanical drawings to determine if fractional horsepower motors are controlled automatically or remotely.

Microprocessor-Based Motor Control: Where specified under specific starter sizes, provide Microprocessor-based Motor Control as Specified herein. The microprocessor-based motor control shall meet the latest applicable sections of Underwriters Laboratories (UL) and National Electrical Manufacturers Association (NEMA).

- (1) Provide motor contactors with NEMA size 1 through 6 ratings as shown on the plans. Provide motor contactors with replaceable fixed and movable contacts. Provide contactors of the electro-mechanical type with the coil controlled by an application specific microprocessor. The microprocessor shall measure control circuit voltage and prevent closing of the coil on low voltage (78 volts ac) and/or high voltage (135 volts ac) conditions which are outside of the coil ratings.
- (2) Microprocessor shall apply voltage to the coil such that a guaranteed maximum of 2 milliseconds of main contact bounce occurs on contactor closure. The microprocessor shall continuously measure coil circuit voltage and current so as to maintain constant coil power at a level to maintain main contact closure and minimize coil power consumption. Provide electronic circuitry such that the coil is isolated from surges to the point where surge suppressers are

not required. Manufacturer is to provide lifetime free coil replacement of any failed coil.

- (3) Microprocessor is to wait for three (3) half (1/2)-cycles of control start signal prior to activating a close to prevent starts resulting from momentary voltage spikes, switching transients, fluttering contacts, and shorted Programmable Logic Control outputs.
- (4) Provide control modules to perform the indicted input/output control functions. Module shall incorporate faceplates having membrane type pushbuttons, and LED's. All push-button and LED functions to be furnished with clear written identification. Control Modules to be provided with individual hand, off, auto push buttons and overload alarm, overload trip with LED and reset push buttons.

In addition, provide motor starter with the below listed features:

- (1) Motor starters shall monitor current in each phase to provide phase loss and phase unbalance protection. Provide phase loss/unbalance protection which requires no time delay for reset.
- (2) Motor starters to provide Class II ground fault protection. Ground fault protection shall be set at 20% of maximum continuous ampere rating and have a start delay of 20 seconds, and a run delay of 1 second to prevent nuisance trip on starting.
- (3) All starters shall be complete with H-O-A (Hand-Off-Auto) selector switch.
- (4) All starters shall have a green "Stop" and a red "Run" pilot light.
- (5) All starters shall have automatic re-start after a power disturbance (power failure, blown-out, phase failure, etc.)

Single Phase AC Fractional Horsepower Manual Starters - 1HP or Less: FHP manual starters shall be Franklin Cerus BAS, Cutler Hammer AN16 or Allen Bradley Bulletin 600. The manual starters shall consist of a hand-off-auto switch equipped with Bimetallic ambient compensated overload relays adjustable + 24%.

- (1) Thermal unit shall be of one-piece construction and interchangeable. The starter shall be inoperative if thermal unit is removed. Contacts shall be double break, silver alloy visible from both sides of starter.
- (2) All Fractional Horse Power Manual Starters shall be double-pole type with one (1) thermal overload relay and red pilot light.

Single and Three Phase AC Microprocessor-Based Starter (All Motors Between 1 HP and 10 HP):

- (1) Motor starters shall be rated in accordance with NEMA sized and horsepower ratings. No starter shall be listed as a ½-size. Motor starters shall be used in discrete control, in motor control centers, and in other user and OEM custom control panels. (IEC contactors are not acceptable).
- (2) Contacts shall be silver alloy, double break, and shall be serviceable on NEMA Sizes 00 through 4 without use of tools. Size 5 and larger shall be inspectable with standard tools. They shall be replaceable without removing the line, load, or control wiring from the starter, and replaceable without removing the starter from the enclosure.
- (3) Coils shall be the encapsulated type, and shall be replaceable on NEMA Sizes 00 through 4 without the use of tools. Size 5 and larger shall be replaceable with standard tools. They should be replaceable without removing the line, load, or control wiring from the starter, and replaceable without removing the starter from the enclosure.
- (4) Overload protection shall be provided by solid state electronic overload relay. Single-phase starters shall provide one-or two-leg overload protection; Three-phase starters shall provide three-leg overload protection.
- (5) Furnish Motor Starter with Solid-State Overload Relay Installed. GE Type 300-Line Enclosed Non-combination Starters, with Solid-State Overload Relay, Housed in Type 1 or 3R NEMA enclosure, Allen Bradley Type No. 509, Franklin Cerus BAS, or prior approved equivalent.
- (6) Electrical characteristics shall be as indicated in drawings.
- (7) Applications (Typical) Direct or Belted to motor equipment and components, fans/blowers, pumps compressors and etc.
- (8) Starter shall be full voltage non-reversing consisting of one contactor and one overload relay assembled together and provided with:
  - (a) Hand-Off-Auto selector switch
  - (b) Red on Light;
  - (c) NC auxiliary contact;
  - (d) Terminal Strips;
  - (e) Phase loss and phase unbalance relay

- (9) Starter shall be suitable for straight through wiring, with separate provision for control power connections at the L.1 and L.2 terminals
- (10) Starter shall have a NEMA solid state electronic overload relay and provide the user with following selectable settings.
  - (a) Selectable Class 10, 20 and 30, protection.
  - (b) Visible trip indicator with manual reset.
  - (c) Built in thermal memory to prevent hot motor restarts.
  - (d) Relay shall be capable of monitoring for motor single phasing with adjustable current unbalance of 20 to 50 percent, and incorporating a signal to an external device.
  - (e) Shall have a reset mechanism that resets on the upstroke only
- (11) Protection Functions:
  - (a) 2:1 Adjustable full load amps with tactile feed back dial.
  - (b) Protection against complete phase current loss.
  - (c) Accuracy: plus or minus 2%.
  - (d) Repeatability: plus or minus 2%.
  - (e) Self-powered @ 50 % of maximum current range.
  - (f) Size: 1-6 (0.40A-50A, 600 V. 50/60 Hz).
    - (g) Unbalance trip signal for PLC operation
    - (h) Manual trip.
    - (i) Built-in line/load straps.
    - (j) Adjustable trip adjustment – Plus or minus 10%. By turning a dial in the overload relay face.
    - (k) Be ambient insensitive within an operating temperature range to minus 20 to plus 70 degrees Celsius.
    - (l) Relative humidity: 95 percent non-condensing.
- (12) Options
  - (a) Control power transformer fusing shall be provide by two primary fuses plus on secondary fuse. Control power transformer secondary voltage shall be 120 VAC.
- (13) Auxiliary Contacts:
  - (a) Contactor to be designed to accommodate two (2) auxiliary contact blocks, each capable of a combination of up to four (4) normally closed (NC) or four (4) normally open (NO) auxiliary contacts.
  - (b) Provide and install a minimum of one (1) spare NO contact and one (1) spare NC contact in addition to any auxiliary contacts specified or required for the proper operation of the temperature controls system.

## INSULATION

### GENERAL:

Pipe insulation shall not begin until all work has been tested and found to be tight. All insulation adhesives, sealers, tapes and mastic shall meet the latest NFPA requirements and shall meet 25/50/50 flame spread and smoke developed ratings.

All insulation shall be installed in strict accordance with the manufacturer's recommendations.

All pipe insulation where recommended by the manufacturer shall be banded with aluminum bands, three to a section and with one band on each side of each fitting, valve, etc.

Insulation shall be continuous through walls and ceilings.

All valves, strainers, etc. shall be insulated the same as its adjacent piping and the covering shall extend all the way up to the equipment.

USE HIGH DENSITY INSULATION INSERTS AT HANGERS ON ALL PIPING 1-1/2" AND ABOVE TO PREVENT CRUSHING OF INSULATION.

**THERMAL INSULATION:**

After all work has been tested and approved, insulate as follows:

INSULATION SHALL BE INSTALLED IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS AND INSTRUCTIONS.

**DOMESTIC WATER PIPING:**

All domestic hot and cold water lines located above slab, above ceilings, and in utility chases shall be insulated with **1/2" high density fiberglass insulation**. Insulation shall have Owens/Corning "25 ASJ/SSL" or Knauf ASJ-SSL Universal Fire Retardant Jacket, All laps are to be sealed and stapled in place.

**Fittings are to be Zeston 25/50 PVC, Knauf 25/50 rated PVC, pre-molded fitting covers with fiberglass inserts.**

**SANITARY SEWER WASTE AND VENT PIPING ABOVE CEILINGS:**

Piping shall be wrapped on outside with 2.33" thick 3/4# density fiberglass insulation with aluminum foil vapor barrier. Insulation shall be taped at all joints and seams and installed per the manufacturer's recommendations.

**CONDENSATE DRAIN PIPING:**

Insulate with 3/4" Aerotube or Armaflex pipe insulation applied in accordance with manufacturer's recommendations and instructions. All joints and seams shall be properly glued and sealed per manufacturer's recommendations.

Main lines 2" and above may be insulated with 2" thick 3/4 # density fiberglass insulation with foil vapor barrier.

All insulation seams and joints shall be sealed airtight to avoid air infiltration into the insulation.

**REFRIGERANT LINES:**

Insulate with 3/4" closed cell, tube insulation, Aerotube, Armaflex or equivalent.

All joints and seams shall be properly glued and sealed per manufacturer's recommendations.

All refrigerant lines (interior, exterior, and above ceilings) shall be covered with Venture Clad adhesive protective coating system.

**HVAC DUCTWORK INSULATION:**

Low Pressure rectangular and round supply, fresh air, and exhaust ductwork (above ceilings) shall be wrapped on outside with 2.33" thick 3/4# density fiberglass insulation with aluminum foil vapor barrier. Insulation shall be taped at all joints and installed per the manufacturer's recommendations.

**HVAC FLEX-CONNECTIONS:**

Shall be wrapped on outside with 2.33" thick 3/4 # density fiberglass insulation with aluminum foil vapor barrier. Insulation shall be taped at all joints and installed per the manufacturer's recommendations.

**SUPPLY AIR DIFFUSERS WITH PLENUMS:**

Plenums shall be completely covered with 2.125" minimum thickness, 3/4# density, minimum installed R-value of R-6.0, fiberglass insulation with aluminum foil vapor barrier. Insulation shall be taped at all joints and installed per the manufacturer's recommendations. Overlap insulation 6" around perimeter of diffuser.

**INSULATION THROUGH HANGERS AND SLEEVES:**

The insulation shall be continuous through pipe hangers and pipe sleeves. At hangers where the pipe is supported by insulation, provide a galvanized iron protection shield. Provide 18-gauge metal saddles between all hangers and insulation. Minimum length of saddle shall be 12" long.

## **WATER SUPPLY**

### SERVICE:

The Contractor shall extend water throughout the project as indicated on the Drawings.

CONTRACTOR SHALL CONTACT OWNER PRIOR TO BID TO DETERMINE THE EXTENT OF THEIR REQUIREMENTS, PAY ALL COSTS FOR CONNECTION AND COMPLETE WORKING INSTALLATION.

### GENERAL:

All water supply piping shall be of materials hereinbefore specified. Make provisions for expansion and contraction of hot water lines by means of expansion bends or loops as required.

All water lines shall be disinfected in accordance with the State of Louisiana Sanitary Code, (Latest Edition of Approved Local Plumbing Code with latest amendments).

All solvent cements and primers used to join or seal PVC pipes shall comply with the requirements of ANSI/NSF 14.

Make up the complete water supply system. Connect to all fixtures and outlets requiring water. All exposed piping shall be chrome plated.

At each fixture or group of fixtures with lines 1-1/4" or below, furnish and install a 12" high air chamber of same size as branch feed line. On lines 1-1/4" and above and at fixtures with quick closing valves such as dishwashers, tempered water valves, etc., install "Shocktrol", "Precision Plumbing Products" or equal water hammer arrester properly sized for each unit.

All piping and outlets conveying non-potable water shall be adequately and durably identified by a distinctive, yellow-colored paint so that it is readily distinguished from piping carrying potable water. See ANSE A13.1. Where non-potable water is used, all valves, branch fittings and branch terminals shall be identified by the words "non-potable water." This identification shall be done in accordance with ANSI A13.1. Such identifications shall not be concealed by pipe insulation and when insulated the insulation shall be painted the same color as is required for the pipe.

All materials used for plumbing installation shall comply with standards and specifications of **MATERIALS FOR PLUMBING INSTALLATIONS** of the standard plumbing code. Each length of pipe and each pipe fitting, trap, fixture, and device used in the plumbing system shall be marked in accordance with the approved standard and specifications to which it is manufactured. All materials used shall be installed in strict accordance with the standards under which materials are accepted and approved.

All new potable water pipes, pipe related products and materials that join or seal pipes and pipe related products shall be evaluated and listed as conforming with a national consensus product (or material) standard and ANSI/NSF Standard 61. All plastic plumbing pipes, plastic plumbing piping components and related material shall be listed as conforming with NSF Standard 14.

All backflow preventers shall comply with appropriate American Society of Sanitary Engineering Standards (ASSE).

All piping in a plumbing system shall be installed without undue strains or stresses and provision shall be made for expansion, contraction, and structural settlement. Vertical and horizontal piping shall be secured at sufficiently close intervals to keep the pipe in alignment and prevent sagging. Hangar/support spacing for vertical piping shall be in accordance with the standard plumbing code. Hangar/support spacing for horizontal piping shall be in accordance with the standard plumbing code.

New plumbing shall be disinfected with chlorine solution containing at least 50 parts per million of available chlorine and allowed to remain in the lines for at least 6 hours, a chlorine residual of at least 5 ppm should remain before the lines are put into use.

### TESTING:

All domestic water lines, unless elsewhere specified, shall be tested under 200 psi hydrostatic pressure for a minimum of five hours. Testing shall be witnessed and documented by the Prime Contractor and copied to the Owner for his record.



### **WASTEWATER DISPOSAL**

#### **SERVICE:**

Extend sanitary sewer waste and vent lines as indicated on Plans.

CONTRACTOR SHALL CONTACT OWNER PRIOR TO BID TO DETERMINE THE EXTENT OF THEIR REQUIREMENTS, PAY ALL COSTS FOR CONNECTION AND COMPLETE WORKING INSTALLATION.

CONTRACTOR SHALL VERIFY LOCATION AND ELEVATION OF SEWER MAIN PRIOR TO ROUGH-IN.

#### **GENERAL:**

The system of sewage and drainage in general shall be as hereinbefore specified.

All work shall be in strict accordance with the Louisiana State Plumbing Code (Latest Edition of Approved Local Plumbing Code with latest amendments) and in accordance with all local requirements. Piping shall be routed as shown on Plans or in an acceptable manner to meet building conditions. Venting shall be as shown on plumbing riser diagrams.

Connections between traps and below slab shall be deep-seal p-traps.

Provide reducers, increasers, special flanges, wax seals, and fittings where required between piping work and fixtures to connect and complete work and render it ready for use. Make any offsets required to avoid construction.

All water closets shall be mounted with 4" closet bends.

All lines 2" and smaller shall be sloped 1/4" per foot; all lines 3" and larger shall be sloped 1/8" per foot. Piping shall be laid so slope is continuous.

All horizontal sewer vent piping located in walls connecting fixture batteries shall be sloped upwards towards vent thru roof and be a minimum of 48" above finished floor. In no case shall a vent be less than 6" above the fixture flood rim.

All materials used for plumbing installation shall comply with standards and specifications of **MATERIALS FOR PLUMBING INSTALLATIONS** of the standard plumbing code. Each length of pipe and each pipe fitting, trap, fixture, and device used in the plumbing system shall be marked in accordance with the approved standard and specifications to which it is manufactured. All materials used shall be installed in strict accordance with the standards under which materials are accepted and approved.

All plastic plumbing pipes, plastic plumbing piping components and related material shall be listed as conforming with NSF Standard 14.

All piping in a plumbing system shall be installed without undue strains or stresses and provision shall be made for expansion, contraction, and structural settlement. Vertical and horizontal piping shall be secured at sufficiently close intervals to keep the pipe in alignment and prevent sagging. Hangar/support spacing for vertical piping shall be in accordance with the standard plumbing code. Hangar/support spacing for horizontal piping shall be in accordance with the standard plumbing code.

#### **TESTING:**

Test all sanitary sewer waste and vent lines inside building with a minimum of 10' water head for 15 minutes, in accordance with the State Plumbing Code. Testing shall be witnessed and documented by the Prime Contractor and copied to the Owner for his record.

### **PLUMBING**

#### **GENERAL:**

Furnish all labor and materials as hereinbefore specified, indicated, or reasonably implied for the complete installation of the following systems:

- Water Supply System
- Sanitary Drainage System
- Compressed Air Piping System
- Compressed Gas Piping Systems (Methane, Hydrogen, Nitrogen, Carbon Dioxide)

**SINK (MARKED "SINK"):**

Sink, faucet, and eye wash shall be furnished by others (Fisher Scientific - cabinet manufacturer). Installation shall be by this contractor.

Contractor shall make final water and drain connections.

Extend cold and hot water piping to hot and cold sides of sink faucet. Install ball type shut-off valves within cabinet and extend to

Furnish and install ASSE 1070 Thermostatic Mixing Valve (total of 4) as manufactured by P.P.P. or prior approved equal for hot water lines associated with the faucet (total of 2) and emergency eye wash (total of 2).

Contractor shall furnish and install stainless steel grid drain strainer in sink drain outlet. Coordinate grid strainer dimensions and type with sink manufacturer. Provide tailpiece, p-trap, and connections to drain piping within utility chase.

**AIR CONDITIONING, HEATING, AND VENTILATING****GENERAL:**

The air conditioning system, in general, shall be for the entire building, providing cooling and dehumidification in summer and heating in winter. A constant amount of fresh air shall be taken into the system and all air shall be filtered.

**REFRIGERANT LINE SIZING:**

Refrigerant lines sizes for each system shall be sized in accordance with the equipment manufacturer's sizing guidelines.

Sizing for each system shall be submitted with equipment shop drawings. The contractor will be required to install refrigerant lines in accordance with equipment manufacturer's requirements. Service stop valves with service port shall be installed on each unit (inside and outside) for servicing systems without shutting down the entire system.

**TESTING REFRIGERANT PIPING SYSTEMS:**

Refrigerant lines shall be tested under 600 (minimum) psi carbon dioxide pressure (or as recommended by manufacturer for refrigerant type used in each system) for 24 hours using soap suds at joints to test for leaks. Contractor shall compete a vacuum test (triple pull down test) at 1500 microns with nitrogen break, then 1000 microns with nitrogen break, then 500 microns – disconnect vacuum pump and hold vacuum for one (1) hour (maximum of 100-point rise within a 1-hour time period). If any tests fail, the contractor shall repair leak(s) and completely re-test the piping system(s) (pressure and vacuum tests). Evacuate system and properly charge with refrigerant.

**LABELING A/C UNITS:**

All indoor and outdoor a/c units shall be labeled with permanent laminated plate riveted to unit. Units shall be labeled as indicated in schedules. Plate shall be black with white unit numbers. Height of unit number shall be minimum of one (1) inch. Label shall also indicate area serviced by unit as noted in schedules. Height of letters shall be minimum of one-half (1/2) inch. Submit sample to Engineer for approval.

**EMERGENCY DRAIN PAN (DX Equipment):**

All VRF AHU's and BC Controllers shall be installed with an emergency drain pan. Allow proper service clearance for equipment.

Drain pans shall be constructed of 20-gauge galvanized metal. Pan shall extend 4" beyond the edge of the unit. The sides of the pan shall be 4" high with drain connection located inside of the pan.

**VENTILATING SYSTEM:**

This Contractor shall furnish and install all exhaust fans shown and scheduled on Plans. Fans shall be of the type indicated and shall be Cook, or approved equivalent.

Fan motors shall be of the 40 deg C ambient temperature rise type and shall be suitable for continuous duty operation. The fan shall be U.L. listed.

## **DEDICATED OUTSIDE AIR SYSTEM**

### **GENERAL**

#### **SYSTEM DESCRIPTION**

The dedicated outside air system (DOAS) shall be a Mitsubishi Electric CITY MULTI VRF (Variable Refrigerant Flow Zoning) System. The DOAS shall be provided with the capability to reheat air using recovered energy from the primary cooling coil or provide a primary cooling coil only. The DOAS shall be of a split system type.

The DOAS reheat system shall consist of a 10 ton PURY/RCH modular outdoor unit, 6 port minimum BC (Branch Circuit) Controller, PEFY-AF1200CFMR indoor unit, and M-NET based controller. System shall be capable of automatically determining mode necessary to provide required air conditions with no interruption to system operation except for defrost operation. The system shall only consist of one indoor unit per outdoor unit.

#### **QUALITY ASSURANCE**

The units shall be listed by Electrical Test Laboratories (ETL) and bear the ETL label. All wiring shall

be in accordance with the National Electrical Code (N.E.C.).

The units shall be manufactured in a facility registered to ISO 9001 and ISO14001 which is a set of standards applying to environmental protection set by the International Standard Organization (ISO).

A full charge of R-410A for the condensing unit only shall be provided in the condensing unit.

System shall be composed of components which meet or exceed the 2010 Federal minimum efficiency requirements and the proposed ASHRAE 90.1 efficiency requirements for VRF systems. Efficiency shall be published in accordance with the DOE alternative test procedure, which is based on the Air-Conditioning, Heating, and Refrigeration Institute (AHRI) Standards 340/360, 1230 and ISO Standard 13256-1.

#### **DELIVERY, STORAGE AND HANDLING**

Unit shall be stored and handled according to the manufacturer's recommendation. **WARRANTY**

The units shall be covered by the manufacturer's limited warranty for a period of one (1) year from date of installation.

If the systems are:

1. designed by a certified Designer.
2. installed by a contractor that has successfully completed the Mitsubishi Electric three day service course, AND
3. verified with a completed commissioning report submitted to and approved by the Mitsubishi Electric Service Department, then the units shall be covered by an extended manufacturer's limited warranty for a period of five (5) years from date of installation.

In addition, the compressor shall have a manufacturer's limited warranty for a period of seven (7) years from date of installation.

If, during this period, any part should fail to function properly due to defects in workmanship or material, it shall be replaced or repaired at the discretion of the manufacturer.

This warranty shall not include labor.

Manufacturer shall have a minimum of thirty years of HVAC experience in the U.S. market.

All manufacturer technical and service manuals must be readily available for download by any local contractor should emergency service be required. Registering and sign-in requirements which may delay emergency service reference are not allowed.

The CITY MULTI VRF system shall be installed by a contractor with extensive CITY MULTI install and service training. The mandatory contractor service and install training should be performed by the manufacturer.

## PRODUCTS

### R2-SERIES OUTDOOR UNIT

#### General:

The reheat DOAS shall be used specifically with the R2-Series PURY outdoor unit using CITY MULTI VRF components. The PURY/RCH outdoor units shall be equipped with multiple circuit boards that interface to the M-NET controls system and shall perform all functions necessary for operation. Each outdoor unit module shall be completely factory assembled, piped and wired and run tested at the factory.

Outdoor unit shall have a sound rating no higher than 60 dB(A). If an alternate manufacturer is selected, any additional material, cost, and labor to meet published sound levels shall be incurred by the contractor.

Both refrigerant lines from the outdoor unit to the BC (Branch Circuit) Controller (Single or Main) shall be insulated.

The outdoor unit shall have an accumulator with refrigerant level sensors and controls.

The outdoor unit shall have a high-pressure safety switch, over-current protection, crankcase heater and DC bus protection.

The outdoor unit shall have the ability to operate with a maximum height difference of 164 feet. The greatest length is not to exceed 541 feet between outdoor unit and the indoor units without the need for line size changes or traps.

The outdoor unit shall be capable of operating in heating mode down to -4°F ambient temperature or cooling mode down to 23°F ambient temperature, without additional low ambient controls. If an alternate manufacturer is selected, any additional material, cost, and labor to meet low ambient operating condition and performance shall be incurred by the contractor.

The outdoor unit shall not cease operation in any mode based solely on outdoor ambient temperature.

The outdoor unit shall have a high efficiency oil separator plus additional logic controls to ensure adequate oil volume in the compressor is maintained.

Unit must defrost all circuits simultaneously in order to resume full heating more quickly. Partial defrost which may extend "no or reduced heating" periods shall not be allowed.

#### Unit Cabinet:

The casing(s) shall be fabricated of galvanized steel, bonderized and finished.

#### Fan

Each outdoor unit module shall be furnished with one or two direct drive, variable speed propeller type fan(s). The fan shall be factory set for operation under 0 in. WG external static pressure, but capable of normal operation under a maximum of 0.24 in. WG external static pressure via dipswitch.

All fan motors shall have inherent protection, have permanently lubricated bearings, and be completely variable speed.

All fan motors shall be mounted for quiet operation.

All fans shall be provided with a raised guard to prevent contact with moving parts. The outdoor unit shall have vertical discharge airflow.

#### Refrigerant

R410A refrigerant shall be required for PURY-P outdoor unit systems.

#### Coil

The outdoor coil shall be of nonferrous construction with lanced or corrugated plate fins on copper tubing. The coil fins shall have a factory applied corrosion resistant blue-fin finish.

The coil shall be protected with an integral metal guard.

Refrigerant flow from the outdoor unit shall be controlled by means of an inverter driven compressor. The outdoor coil shall include 4 circuits with two position valves for each circuit, except for the last stage.

#### Compressor

Each outdoor unit module shall be equipped with one inverter driven scroll hermetic compressor.

Non-inverter-driven compressors shall not be allowed.

A crankcase heater(s) shall be factory mounted on the compressor(s).

The outdoor unit compressor shall have an inverter to modulate capacity.

The capacity shall be completely variable with a turndown of 18% of rated capacity.

The compressor will be equipped with an internal thermal overload.

The compressor shall be mounted to avoid the transmission of vibration.

**Electrical**

The outdoor unit electrical power shall be 208, 3-phase, 60 hertz.

The outdoor unit shall be capable of satisfactory operation within voltage limits of 187-228 volts (208V/60Hz) The outdoor unit shall be controlled by integral microprocessors.

The control circuit between the indoor units, BC Controller and the outdoor unit shall be 24VDC completed using a 2-conductor, twisted pair shielded cable to provide total integration of the system.

**BRANCH CIRCUIT (BC) CONTROLLERS FOR R2-SERIES SYSTEMS****General**

The BC (Branch Circuit) Controllers shall be specifically used with R410A R2-Series systems. These units shall be equipped with a circuit board that interfaces to the M-NET controls system and shall perform all functions necessary for operation. The unit shall have a galvanized steel finish. The BC Controller shall be completely factory assembled, piped and wired. Each unit shall be run tested at the factory. This unit shall be mounted indoors, with access and service clearance provided for each controller. The DOAS BC Controller shall be connected to only one indoor unit, the DOAS indoor unit.

**BC Unit Cabinet:**

The casing shall be fabricated of galvanized steel.

Each cabinet shall house a liquid-gas separator and multiple refrigeration control valves. The unit shall house two tube-in-tube heat exchangers.

**Refrigerant**

R410A refrigerant shall be required.

**Refrigerant valves**

The unit shall be furnished with multiple branch circuits which can individually accommodate up to 54,000 BTUH. Branches may be twinned to allow more than 54,000 BTUH.

Each branch shall have multiple two-position valves to control refrigerant flow. Service shut-off valves shall be field-provided/installed for each branch.

Linear electronic expansion valves shall be used to control the variable refrigerant flow.

**Integral Drain Pan**

An integral condensate pan and drain shall be provided.

**Electrical**

The unit electrical power shall be 208/230 volts, 1 phase, 60 hertz.

The unit shall be capable of satisfactory operation within voltage limits of 187-228 volts (208V/60Hz) or 207- 253V (230V/60Hz).

The BC Controller shall be controlled by integral microprocessors.

The control circuit between the indoor units and the outdoor unit shall be 24VDC completed using a 2- conductor, twisted pair shielded cable to provide total integration of the system.

**PEFY-AF1200CFMR/HCH-104 (REHEAT OPTION), 100% OSA DUCTED INDOOR UNIT****General:**

The PEFY-AF1200CFMR (Reheat Option) unit shall be a ducted indoor fan coil that mounts where needed with a fixed rear return and a horizontal discharge supply, primary and reheat coil, and three modulating linear expansion devices. The PEFY-AF1200CFMR/HC-134G shall be used with the R2-Series outdoor unit and BC Controller to create a DOAS. The PEFY-AF1200CFMR shall support individual control using M-NET DDC controllers. The PEFY-AF1200CFMR model shall feature external static pressure settings up 0.96 in. WG, depending on voltage.

**Indoor Unit**

The indoor unit shall be factory assembled, wired and run tested. Contained within the unit shall be all factory wiring, primary cooling coil, reheat coil, temperature and humidity sensors, piping, electronic modulating linear expansion device, control circuit board and fan motor. The unit shall have a self-diagnostic function, 3-minute time delay mechanism, and an auto restart function. Indoor unit and refrigerant pipes shall be charged with dehydrated air before shipment from the factory.

**Unit Cabinet**

The cabinet shall be ducted on both the supply and return

The cabinet panel shall have provisions for a field installed filtered outside air intake.

**Fan**

The indoor unit fan shall be an assembly with two Sirocco fan(s) direct driven by a single motor.

The indoor fan shall be statically and dynamically balanced to run on a motor with permanently lubricated bearings.

The indoor unit shall have a ducted air outlet system and ducted return air system.

**Filter**

Outside air shall be filtered by a field-supplied filter. Unit shall have sufficient external static pressure to operate with a MERV-13 filter installed.

**Coil**

The indoor coil shall be of nonferrous construction with smooth plate fins on copper tubing. The tubing shall have inner grooves for high efficiency heat exchange.

All tube joints shall be brazed with phos-copper or silver alloy. The coils shall be pressure tested at the factory.

A condensate pan and drain shall be provided under the coil.

A condensate lift mechanism shall be factory installed capable of providing up to 21-11/16" of lift. All refrigerant lines to the PEFY indoor units shall be insulated.

**Electrical**

The unit electrical power shall be 208/230 volts, 1-phase, 60 hertz.

The system shall be capable of satisfactory operation within voltage limits of 187-228 volts (208V/60Hz) or 207-253 volts (230V/60Hz).

**Controls**

This unit shall use controls provided by Mitsubishi Electric to perform functions necessary to operate the system.

**OPERATION****DEDICATED OUTSIDE AIR SYSTEM WITH REHEAT CAPABILITY (PEFY-AF1200CFMR)****General:**

The DOAS reheat system shall be rated at 87° F DB/80° F WB in cooling for both the outdoor unit and indoor unit entering air conditions. Heating rating point shall be 32° F DB/28° F WB for the outdoor unit and 32° F DB indoor unit entering air conditions.

**System operation parameters:**

The system shall operate with intake air temperature ranging from -4° F WB up to 95° F WB.

- a. The unit shall be capable of intake of unmixed or untreated -4° F WB air directly to the primary coil.
- b. The unit shall be capable of providing active coil operation in cooling mode down to 50° F WB.

In a cooling condition, the system shall be capable of providing supply air for downstream use within the following specifications at rated conditions

Operation Type	Minimum Leaving Air Condition		Maximum Leaving Air	
	Degrees F, Dry	Degrees F, Wet	Degrees F, Dry	Degrees F,
Cooling Only, No Reheat	50	50	60	60
Cooling Mode with Reheat	63	51.5 (45% RH)	83	67.5 (45%
Cooling Only, No reheat uses only primary cooling coil. Leaving air temperature can be chosen between 50 and 60 deg F in one degree increments.				
Cooling mode with reheat uses both primary cooling coil and reheat coil. Leaving air temperature from reheat coil can be chosen between 63 and 83 deg F in one degree F dry bulb increments along				
3. In heating mode, the system shall be capable of providing 78° F DB supply air at rated conditions.				

## CONTROLS

## SMART ME REMOTE CONTROLLER (PAR-U01MEDU)

The Smart ME Remote Controller (PAR-U01MEDU) shall be capable of controlling up to 16 indoor units (defined as 1 group). The Smart ME Remote Controller shall be approximately 5.5" x 5" in size and white in color with an auto-timeout touch screen LCD display. The Smart ME Remote Controller shall support a selection from multiple languages (English, Spanish or French) for display information. The Smart ME supports temperature display selection of Fahrenheit or Celsius. The Smart ME Remote Controller shall control the following grouped operations: On/Off, Operation Mode (cool, heat, auto\*, dry, fan and setback\* (\*R2/WR2-Series Simultaneous Heating and Cooling only)), temperature set point, fan speed setting, and airflow direction setting. The Smart ME Remote Controller shall support timer settings of on/off/temperature up to 8 times in a day in 5-minute increments. The Smart ME Remote Controller shall support an Auto Off timer. The Smart ME Remote Controller shall be able to limit the set temperature range from the Smart ME Remote Controller, or via a PC through a licensed EB-50GU. Also, the temperature range can be set from a touch screen panel on the TC-24. The room temperature shall be sensed at either the Smart ME Remote Controller or the Indoor Unit dependent on the indoor unit dipswitch setting. The Smart ME Remote Controller shall display a four-digit error code in the event of system abnormality or error.

The ME Remote Controller shall only be used in same group with other ME Remote Controllers with a maximum of two ME Remote Controllers per group.

The ME Remote Controller shall require manual addressing using rotary dial switch to the M-NET communication bus. The ME Remote Controller shall connect using two-wire, stranded, non-polar control wire to TB5 connection terminal on the indoor unit.

PAR-U01MEDU (Smart ME Remote Controller)			
Item	Description	Operation	Display
ON/OFF	Run and stop operation for a single group	Each Group	Each Group
Backlight	Turns on when screen is touched. Timeout duration is adjustable.	Each	Each

PAR-U01MEDU (Smart ME Remote Controller)			
Item	Description	Operation	Display
		Group	Group
Operation Mode	Switches between Cool/Dry/Auto/Fan/Heat/Setback. Operation modes vary depending on the air conditioner unit. Auto and Setback mode are available for the R2/WR2-Series only.	Each Group	Each Group
Temperature Setting	Sets the temperature from 40°F – 95°F depending on operation mode and indoor unit. Separate COOL and HEAT mode set points available depending on central controller and connected mechanical equipment.	Each Group	Each Group
Fan Speed Setting	Available fan speed settings depending on indoor unit.	Each Group	Each Group
Air Flow Direction Setting	Air flow direction settings vary depending on the indoor unit model.	Each Group	Each Group
Room Temp and Humidity Display	Displays the room temperature and humidity on the Home screen. Temperature and Humidity sensed can be calibrated using the sensor offset in 1 °F or 1% RH increments.	N/A	Each Group
Occupancy Sensor	Detects occupancy using an infrared motion sensor. Occupancy status is indicated on the remote controller and through the web interface depending on connected equipment. Sensitivity is adjustable.	N/A	Each Group
Brightness Sensor	Detects brightness in the space and indicates brightness on the remote controller and through the web browser interface depending on connected equipment. Sensitivity is adjustable.	N/A	Each Group

Status Monitor	Displays the status of general equipment control points connected to the Advanced HVAC Controller (DC-A2IO)	N/A	Each Group
Humidity Setting	Sets the relative humidity set point in 1% increments for any humidifier connected to the Advanced HVAC Controller (DC-A2IO)	Each Group	Each Group
LED Indicator	Can be set to indicate the operation status by lighting and flashing with different colors and brightness or by turning off to signal operation mode, stopped unit, error, occupancy, or home screen button pushes. Color can be set to indicate the current mode selected or room temp range being sensed. *Available colors include blue, light blue, yellow, white, green, red, and lime.	Each Group	Each Group
Schedule	Set up to 8 operations per day, 7 days per week. Operations include time on/off, mode and room temperature set point.	Each Group	Each Group
Permit / Prohibit Local Operation	Individually prohibit operation of each local remote control function (Start/Stop, Change operation mode, Set temperature, Fan Speed, Air Direction, Reset filter). Operation icon lights up on the remote controller for prohibited functions.	N/A	Each Group *1
Energy-Save control during vacancy	When vacancy is detected by the occupancy sensor 5 control options are available for selection:  Stop/Setback Mode/Set Temperature Offset/Low Fan Speed/Thermo-	Each Group	Each Group

PAR-U01MEDU (Smart ME Remote Controller)			
Item	Description	Operation	Display
	off  Brightness sensor can be used in conjunction with the occupancy sensor to increase accuracy.		
Error	When an error is currently occurring on an air conditioner unit, the afflicted unit and the error code are displayed	N/A	Each Unit
Test Run	Operates air conditioner units in test run mode.	Each Group	Each Group
Ventilation Equipment	Up to 16 indoor units can be connected to an interlocked system that has one LOSSNAY unit. LOSSNAY items that can be set are "Hi", "Low", and "Stop". Ventilation mode switching is not available.	Each Group	Each Group
Set Temperature Range Limit	Set temperature range limit for auto, cool (drying) and heat modes.	Each Group	Each Group
Operation Lock Out	Locking of ON/OFF, Mode, Set Temp, Hold button and Air Direction.	Each Group	Each Group
Password	User and Service password protections are available	Each Group	N/A
Hold	Hold Prohibits the scheduled operation from being executed ON/OFF timer Auto-OFF timer Weekly timer Automatic return to the preset temperature * While an operation is prohibited by Hold function, the operation icon lights up.	Each Group	Each Group



## **VARIABLE FREQUENCY DRIVES**

Variable Frequency Drives (VFD's) for new Exhaust Fans shall serve Fume Hood Exhaust Fans Motors. Motor sizes shall be as indicated in schedules. Coordinate final motor size with Exhaust Fan manufacturer.

All Variable Frequency Drives (VFD's) specified under this section shall be provided by the same manufacturer.

Provide one (1) VFD per Exhaust Fan (Total of 9) and one space VFD for Owner Spare Parts (Total of 1).

All VFD's installed in return air plenums shall be plenum rated.

Extent of motor starter and/or variable frequency drive work is indicated by drawings, schedules and specifications. All motors and mechanical equipment provided with motors supplied by the Mechanical Contractor shall be also provided with Motor Starters and/or Variable Frequency Drives. It is the responsibility of the Mechanical Contractor to insure that all VFD's are sized and suitable for the intended purpose of the mechanical equipment provided.

The Mechanical Contractor shall provide the VFD's to the Electrical Contractor for mounting, installation, and connection by the Electrical Contractor.

Disconnecting means unless integral to the Starter/VFD shall be provided by the Electrical Contractor.

Variable Frequency Drives (VFDs): Stand-alone dual output Variable Frequency Drives.

All Variable Frequency Drives shall be of the same manufacturer.

Variable Frequency Drives located in mechanical rooms shall be Free-Standing Units.

Variable Frequency Drives shall be plenum rated where installed in mechanical rooms which are used as return air plenums.

Variable Frequency Drives (VFD's), Variable Speed Controllers (VSD's), and Adjustable Speed Drives are also referred to as AC Drives and their nomenclature shall be used interchangeably.

Drives are for use with NEMA -B or NEMA -E, MG-1 design AC motors.

Drives coordinated short circuit current shall be rated in accordance with UL 508C -Standard for Safety for Power Conversion Equipment.

Drives which do not bear the short circuit current on the drive nameplate shall not be permitted.

Drives shall also be tested in accordance with NEMA ICS 7.1 -Safety Standard for the Construction and Guide for Selection, Installation, and Operation of Adjustable Speed Drive Systems.

### REFERENCES

ANSI/NFPA 70 - National Electric Code

IEC 60068, Part 2-3

NEMA ICS

UL 50, 98, 507, 508, 508C, 991

OSHA 1910.95 - AC Drive Controller Acoustical Noise

### MANUFACTURERS

Acceptable Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated in the Work include the following: Yaskawa Z1000, Franklin Cerus.

### GENERAL

Environmental Ratings:

The Service Voltage for the Project is 480/3/60.

The AC Drive shall meet IEC 60664-1 Annex A and NEMA ICS 1, UL, and CSA standards.

For indoor installation, the AC Drive shall be designed to operate in an ambient temperature environment from 0°C to 40°C (32°F to 104°F).

The storage temperature range shall be -25°F to 60°C (-13°F to 149°F)

The maximum humidity shall be 90 % at 40°C (104°F) non-condensing.

The AC Drive shall meet the IEC 60721-3-3M3 operational vibration specification.

Drives shall be plenum rated where installed in return air plenums.

Construction:

For indoor installation the AC Drive power converter shall be enclosed in a Type 12K (NEMA 12) enclosure with top and bottom conduit knockouts with a circuit breaker disconnect, industrial rated operator controls, user terminal strip connections, and by-pass controls.

The enclosure shall provide dedicated user terminals for power and control device connection.

Provisions shall be included for locking the disconnect in the "OFF" position with a padlock.

All enclosure heat sink fans shall be front accessible and shall not require the removal of the AC Drive converter.

Provide 5% DC Bus Reactor, Service Switch, LCD Keypad.

Provide Service Switch.

Provide Circuit Breaker Disconnect with UL508A Panel SCCR of 100k ms.Sym., 480V (In lieu of Standard Input Disconnect).

#### Harmonic Mitigation:

The electrical distribution system shall be designed to meet IEEE-519-1992 with the addition of line reactors. These line reactors shall be mounted inside the drive enclosure.

All VFD's shall be rated for "constant torque" at temperatures stated in section 2.2, B and shall be capable of operating in location shown on contract documents.

Provide internal cooling fans sized and rated for the conditions stated above.

The controller, bypass assembly, disconnect switch and controls shall be by the same manufacturer, factory installed, and shall be self-contained in a single convection cooled cabinet.

All terminal blocks provided for field wiring shall be pre-wired at the factory.

The VFD shall utilize Pulse Width Modulated (PWM) design with latest generation IGBT's.

Unit shall be UL listed and rated.

Unit shall have output current rating of 110% of motor FLA for one (1) minute.

Unit shall take incoming fixed frequency three-phase AC power into a variable frequency and voltage for controlling the speed of three-phase AC motors.

The motor current shall closely approximate a sine wave.

Motor voltage shall be varied with frequency to maintain desired motor magnetization current suitable for centrifugal pump and fan control and to negate the need for motor derating.

Provide short circuit and ground fault protection.

Provide non-volatile memory.

Provide and be capable of single-phase input operation with 50% VFD derating.

Minimum efficiency shall be 97% at full load, full speed.

Unit shall be capable of operation on an AC line containing line notching and up to 10% THD and capable of operation with motor disconnected from output.

VFD to be compatible with NEMA Design "B" motors.

VFD shall report to the Building Automation System (BAS) via a direct N2 connection.

An advanced sine wave approximation and voltage vector control shall be used to allow operation at rated motor shaft output at nominal speed with no derating. This voltage vector control shall minimize harmonics to the motor to increase motor efficiency and life.

#### Reference Signal:

In the event of loss of the reference signal. The VFD shall alarm and go to one of the following user programmable conditions: Stop, Maintain last reference, Go to pre-set speed, and Go to maximum speed.

The VFD shall include a full-wave diode bridge or SCR rectifier and maintain a fundamental power factor near unity regardless of speed or load. If SCR's are utilized, they shall be gated fully on once pre-charge is complete.

The VFD and options shall be tested to ANSI/UL Standard 508. The complete VFD, including all specified options, shall be assembled by the manufacturer, which shall be UL-508 certified for the building and assembly of option panels. Local representative panel shop assembly for option panels is not acceptable. The appropriate UL stickers shall be applied to both the drive and option label, in the case where these are not contained in one panel.

The VFD shall have a DC link reactor to minimize power line harmonics. VFDs without a DC link reactor shall provide a 3% impedance line reactor.

The VFD's full load amp rating shall meet or exceed NEC Table 430-150. The VFD shall be able to provide full rated output currently continuously, 110% of rated current for 60 seconds and 150% of rated current for up to 0.3 seconds while starting.

The VFD shall be able to provide full torque at any selected speed up to base speed to allow driving direct drive fans without derating.

The VFD shall be provided with a selectable soft start, linear, or S-curve start function.  
Provide selectable ramp to stop, coast, brake, and S-curve stop function.

An automatic energy optimization selection feature shall be provided standard in the drive. This feature shall automatically and continually monitor the motor's speed and load and adjust the applied voltage to maximize energy savings.

An automatic motor adaptation test algorithm shall measure motor stator resistance and reactance to optimize performance and efficiency. It shall not be necessary to run the motor and decouple the motor from the load to run the test.

### PROTECTIVE FEATURES

Class 10 I square root electronic motor overload protection for single motor applications and thermal-mechanical overloads for multiple motor application.

Phase-to-phase and phase to neutral short circuit protection. Drive shall include current sensors on all three output phases to detect and report phase loss to the motor. The VFD will identify which of the output phases is low or lost.

Protection against input transients, loss of AC line phase, short circuit, ground fault, over voltage, under voltage, drive over temperature and motor over temperature. The VFD shall display faults in plain English. Codes are not acceptable.

Protect VFD from sustained or intermittent power or phase loss. The VFD shall provide full rated output with an input voltage as low as 90% of the nominal. The VFD will continue to operate with reduced output with an input voltage as low as 285 volts for 480 Volt units.

The VFD shall incorporate a motor preheat circuit to keep the motor warm and prevent condensation build up in the stator.

Drive shall maintain logic control and shall not fault for 2 seconds after a power loss.

Drive shall have semi-conductor rated input fuses to protect power components.

To prevent breakdown of the motor winding insulation, the dV/dt must be below 1500 V/msec per IEC recommendations. The supplier shall include with the quotation the V/dt values of the drive.

Drive shall include a "signal loss detection" circuit to sense the loss of the control signal and shall be programmable to react as desired in such instance.

Drive shall catch a rotating motor operating forward or reverse up to full speed.

VFD shall be rated for a minimum 60,000 amp interrupting capacity (AIC).

Drive shall include UL 508C programmable electronic motor overload.

Drive shall continue to operate without faulting until input voltage exceeds 604 volts on 480-volt drives.

### INTERFACE FEATURES

Hand/Start, Off/Stop and Auto/Start selector switches shall be provided to start and stop the drive and determine the speed reference.

Provide a 24 V DC output signal to indicate that the drive is in Auto/Remote mode.

Digital manual speed control. Potentiometers are not acceptable.

Lockable, alphanumeric backlit display keypad that can be remotely mounted up to 10 feet away using standard 9-pin cable.

All keypads shall be identical and interchangeable.

Drive shall be capable of being operated with the keypad removed.

All drives shall utilize the same control keypad.

To setup multiple drives, it shall be possible to upload all setup parameters to the drive's keypad, place that keypad on all other drives in turn and download the setup to each drive.

Display shall be programmable to display in English.

The display shall have minimum of four lines, with 20 small characters or eight large characters on each line.

Three (3) lines of the display shall allow free programming so that the exact unit controlled by the drive can be identified.

A red "FAULT" light, a yellow "WARNING" light and a green "POWER-ON" light shall be provided. These indications shall be visible both on the keypad and on the drive when the keypad is removed.

A quick setup menu with the most common HVAC parameters shall be provided on the drive eliminating the need for macros.

The drive shall be fitted with an RS 485 serial communications port with capability for remote monitoring signals.

Two set-point control interface (PID control) shall be standard in the unit. Drive shall be able to look at two feedback signals, compare with two set-points and make various process control decisions.

Floating point control interface shall be provided to increase/decrease speed in response to switch closures.

Sleep mode shall be provided to automatically stop the drive when speed drops below set "sleep" level for a specified time. Drive automatically restarts when speed command exceeds set "wake" level.

Run permissive circuit shall be provided to accept a "system ready" signal to assure that the drive does not start until dampers or other auxiliary equipment are in the proper state for drive operation.

An elapsed time meter and kWh meter shall be provided.

The following displays shall be accessible from the control panel in actual units:

Reference Signal Value in actual units

Output Frequency in Hz or percent

Output Amps

Motor HP

Motor KW

KWH

Output Voltage

No Load Warning

DC Bus Voltage

Drive Temperature in degrees

Motor Speed in engineering units per application (in percent speed, GPM, CFM). Drive will read out the selected engineering unit either in a linear, square or cubed relationship to output frequency as appropriate to the unit chosen.

Up to four-meter displays can be shown at once on the display. This allows the actual value of the follower signal to be shown simultaneously with the drive's response to that signal for ease in commissioning.

Drive will sense the loss of load and signal a no load/broken belt warning or fault.

The VFD shall have temperature controlled internal cooling fans for quiet operation and minimized losses. Fan shall be sized for ambient conditions in which drive is installed. Drives that overheat in Mechanical spaces (ambient temperatures at 120 deg. F or below) for the installed load, shall be removed and replaced with suitable new unit, at no cost to Owner.

The VFD shall store in memory the last four (4) faults (minimum) and record all operational data.

Seven (7) programmable digital inputs shall be provided for interfacing with the systems control and safety interlock circuitry.

Two (2) programmable relay outputs, one form C 240 V AC, one Form A 50 V AC, shall be provided for remote indication of drive status.

Two programmable analog inputs shall be provided and shall accept a direct-or-reverse acting signal. Analog reference inputs accepted shall include 0-10V dc, 0-20 mA and 4-30mA.

Two programmable analog outputs shall be provided for indication of drive status.

These outputs shall be programmable for output speed, voltage, frequency, amps and input kW.

#### ADJUSTMENTS

VFD shall have an adjustable carrier frequency.

Seven (7) preset speeds shall be provided.

Two (2) acceleration and two (2) deceleration ramps shall be provided.

Acceleration and deceleration time shall be adjustable over the range from 0 to 3,600 seconds to base speed.

The shape of these curves may be automatically contoured to prevent tripping.

Four current limit settings shall be provided.

If the VFD trips on one of the following conditions, the VFD shall be programmable for automatic or manual reset: under voltage, over voltage, current limit, inverter overload and motor overload.

The number of restart attempts shall be selectable from 0 through 20 and the time between attempts shall be adjustable from 0 through 600 seconds.

An automatic "on delay" may be selected from 0 to 120 seconds.

#### BYPASS

Manual Bypass is not required.

#### SERVICE CONDITIONS

Unit shall be suited to operate in environmental temperatures up to 122 deg. F (50 deg. C), and up to 90% relative humidity (non-condensing) expected for environment in which installed. Provide high capacity cooling fans and enclosures rated for ambient conditions.

Input AC line voltage variation, -10 to +10% of nominal with full output. Input frequency - +/- 5% 50/60 Hz. 3-phase, 3-wire, phase sequence insensitive.

Service Factor: 1.0

No side clearance shall be required for cooling of any NEMA 1 units, or of any NEMA 12 units of less than 75 HP at 460 volts. All power and control wiring shall be done from the bottom of the drive, unless otherwise noted or coordinated differently from that stated by Contractor.

#### QUALITY ASSURANCE

To ensure quality and minimize failures at the job site, the complete VFD shall be tested by the manufacturer. The VFD shall operate a dynamometer at full load and the load and speed shall be cycled during the test.

All features shall be functionally tested at the factory for proper operation.

#### SUBMITTALS

Submit manufacturer's performance data including dimensional drawings, power circuit diagrams, installation and maintenance manuals, warranty description, VFD's FLA rating, certification agency file numbers and catalog information.

The specification lists the minimum VFD performance requirements for this project. Each supplier shall list any exceptions to the specification. If no departures from the specification are identified, the supplier shall be bound by the specification.

Indicate all field wiring and factory wiring clearly in submittal. All field wiring other than work shown to be part of Division 16 work on electrical drawings shall be by Division 15 Contractor furnishing drives.

#### START-UP SERVICE

Installation of drives shall be in compliance and in accordance with manufacturer's instructions, drawings, and recommendations.

The manufacturer shall provide start-up, testing, and commissioning of the variable frequency drive(s); to certify and inspect the installation of the drive; and to verify all circuits by a factory certified service/technical representative who is experienced in start-up and repair services. The technical representative shall be the same personnel that will provide the factory service and warranty repairs at the customer's site. Sales personnel and other agents who are not factory certified technicians for VFD field repair shall not be acceptable as commissioning agents. Start-up services shall include checking for verification of proper operation and installation for the VFD, its options and its interface wiring to the building automation system.

#### WARRANTY

The VFD shall be warranted by the Contractor for a period of three (3) years (36 months) from date of substantial completion of the project and not from date of shipment or installation. The contractor shall include in his bid, all manufacturer's "extended warranty" costs associated with this requirement. The Warranty shall include all parts, labor, travel costs and living expenses incurred by the manufacturer to provide factory authorized on-site service. The warranty shall be provided by the VFD manufacturer.

#### Documentation:

The AC Drive manufacturer shall provide a comprehensive 8 " x 11" bound instruction/installation manual that includes wiring diagrams, layout diagrams, and outline dimensions. The manual shall be in a 3-hole binder and punched for insertion into a shop manual supplied by the installing Contractor.

#### EXAMINATION

Contractor and factory start-up technician shall verify that job site conditions for installation meet factory recommended and code-required conditions for VFD installation prior to shop drawing submittal. These conditions shall be re-verified prior to start-up, including clearance spacing, temperature, contamination, dust, and moisture of the environment. Separate conduit installation of the motor wiring, power wiring and control wiring, and installation per the manufacturer's recommendations shall be verified. Factory certified service technician, by virtue of completing the "start-up" of the drive, is certifying that actual environmental/code required conditions have been found to be satisfactory or have been corrected to manufacturer's satisfaction (if originally found unsatisfactory). A start-up sheet signed by the factory certified service technician shall be bound into the final Operation and Maintenance Manuals turned over to the Owner's Representative.

The VFD is to be covered and protected from installation dust and contamination until the environment is cleaned and ready for operation.

The VFD shall not be operated while the unit is covered.

#### TRAINING & DEMONSTRATION

##### Demonstration Services:

Arrange and pay for a factory-authorized service representative to train Owner's maintenance personnel on the following: Procedures and schedules related to start-up and shut down, troubleshooting, servicing, preventative maintenance, and how to obtain replacement parts.

Familiarization with contents of Operating and Maintenance Manuals specified in contract documents.

Provide Service Manuals for each variable frequency drive specified.

Provide four (4) hours of factory authorized training.

Schedule training with Owner's Representative with at least seven (7) days' notice.

### **AIR DISTRIBUTION**

#### **GENERAL:**

Furnish and install all ducts for Air Conditioning, Heating and Ventilating System as shown on the plans and as may be required to provide complete system. Ductwork shall be complete with grilles, vanes, flashings, hangers, flexible connections at equipment (A.H.U.'s, etc.), splitters, manual dampers, fresh air inlets, louvers, reinforcing angles, etc. All ductwork shall be concealed and insulated as hereinafter specified.

ALL DUCTWORK SIZES INDICATED ON DRAWINGS ARE METAL-TO-METAL OUTSIDE DIMENSIONS.

#### **DUCT HANGERS AND SUPPORTS**

All ductwork shall be properly braced to prevent rattling, breathing or other unnecessary noise. No sharp edges or obstructions shall project into the air stream. (1" wide x 16 gauge minimum)

#### LOW PRESSURE DUCTWORK

All Outside Air ductwork associated with DOAS Units shall be galvanized steel and shall be of gauges and construction as recommended by ASHRAE Guide and Data Book. Gauges are as follows, with longest side governing. (Duct dimensions on Plans are metal-to-metal dimensions).

Dimensions of longest side	Sheet Metal Gauge
0"-12"	26 Gauge
13"-30"	24 Gauge
31"-54"	22 Gauge
55"-84"	20 Gauge

All ductwork shall be sealed at seams and joints with tape and hardcast duct sealant material.

Joints and reinforcing shall be as per ASHRAE Guide and Data Book and all slips shall be installed without edge of internal part of slip facing downstream.

Construction standards of Article 110 of the National Board of Fire Underwriters, Bulletin 90, latest edition, shall apply throughout.

Flashings shall be sheet copper, and shall be furnished and installed around all outside openings used for ducts of fans and wherever required. Roof flashings shall extend at least 8" above roof.

All ducts shall be straight and true and installed in a neat and workmanlike manner.

All edges shall be straight and true, and all bends shall be made with vaned turns. Where long radius turns cannot be used, the Contractor shall use square turns and use air splitters spaced not more than 3" center to center, and of a length so air will be properly distributed over the ducts.

#### ROUND OUTSIDE AIR DUCTWORK

Shall be constructed of 26 gauge galvanized sheet metal with screwed and taped joints. At contractor's option, pre-insulated flexible ductwork as manufactured by Thermaflex Model MKE, Flexmaster 8M or approved equal may be used to connect to ceiling diffusers (maximum 5'-0" length).

#### DUCT INSULATION

Low pressure rectangular, round, fresh air, and exhaust ductwork (above ceilings) shall be wrapped on outside with 2.33" thick, 3/4" density fiberglass insulation with aluminum foil vapor barrier. Insulation shall be taped at all joints and installed per manufacturer's recommendations.

#### EXTERNAL DUCT INSULATION:

Outside Air Supply Low pressure rectangular and round supply ductwork shall be wrapped on outside with 2.125" minimum thickness, 3/4" density, minimum installed R-value of R-6.0, fiberglass insulation with aluminum foil vapor barrier. Insulation shall be taped at all joints and installed per manufacturer's recommendations.

#### DUCT ACCESSORIES

Dampers of the fusible link operated type shall be provided in all ductwork passing through the floor or firewalls. In all cases, the time rating of damper shall be equal to or greater than the time rating of the wall.

Provide quadrant or adjustable splitters and mark shaft to give position of splitter damper in duct.

Provide vanes behind every supply grille or diffuser. Vanes shall be Tuttle and Bailey "Ducturns", Barber Coleman Uniflo or equivalent. Shop fabricated vanes will be acceptable. All dampers shall be constructed of 14-gauge steel.

#### REGISTERS, GRILLES AND DIFFUSERS:

Square or rectangular ceiling supply outlets, unless noted otherwise, shall be Titus, Metalaire, or equal, as indicated in schedules. Color shall be white. Grilles shall be of aluminum construction with baked enamel finish. Where noted

on plans, grilles with fire dampers in ceiling shall be steel construction with fire rated blanket behind grille as required by grille type scheduled.

All wall supply grilles shall be complete with horizontal and vertical adjustable deflectors and opposed blade volume control damper. Grilles shall be manufactured by Titus, Metalaire, or prior approved equivalent.

Return air grilles shall be as manufactured by Titus, Metalaire, or equivalent, and shall be of the style called for on the Plans.

All supply and return outlets shall be sealed to interior finish with a sponge rubber gasket.

All grilles, diffusers and registers shall be of sizes and type as indicated on Plans or scheduled on Drawings.

#### **MOTORIZED DAMPERS**

Mechanical Contractor shall furnish and install aluminum motorized dampers at outdoor intakes as indicated on drawings. Damper shall be opposed blade motorized type equivalent to Ruskin CD40, or approved equal. Motorized dampers shall be operated by 24 volt electric actuator as indicated on plans. Damper shall be complete with outboard support bearing, blade, and jamb seals. Dampers shall be low - leakage type. Dampers shall go to closed position when units are off. Provide end switch on dampers for controls interlock requirements.

#### **SPIN COLLARS:**

All round take-offs to round branch duct shall be made with factory fabricated spin-type collar fittings with balancing damper and constructed of minimum 26 ga galvanized steel. The damper shall have a raised 2" handle with a high-quality locking quadrant. A 3/8" continuous rod with "U" bolts connects the damper to the rod. Nylon end bearing are required where the rod penetrates the spin collar barrel. These spin-collars shall be as manufactured by Flexmaster Model FLD-B03, Dace #26ga MSD-C03 or approved equal.

#### **DUCTWORK SEALANT:**

All Outside Air Supply, Restroom Exhaust, Janitor Closet Exhaust, and Dryer Exhaust ductwork shall be sealed airtight. All seams, both shop made, and field installed, and shall be sealed with mastic. All transverse joints shall be sealed as well as spin collar takeoffs and rough duct connections. All duct connections and seams shall be sealed with a UL approved non-flammable mastic system. Strict adherence to manufacturer's installation instruction is required. The duct sealant shall be equal to Hardcast SURE-GRIP 404, United McGill Solvent Based Duct Sealant, or prior approved duct sealing system. All surfaces shall be rated for 25/50 Flame Spread and Smoke Development.

All ductwork shall be sealed to "Seal Class A". Seal Class A is transverse joints and seams and wall penetrations (sensors).

#### **PROTECTION:**

HVAC Equipment, ductwork, etc. shall be clean when installed and kept clean during construction.

Provide temporary closures of metal or taped polyethylene on HVAC equipment, open ductwork, VRF Indoor units, and/or vent systems during construction to prevent construction dust from entering equipment and duct systems.

Equipment and system components that are not protected shall be cleaned by the contractor at the contractor's expense prior to acceptance.

All materials stored on site during construction shall be properly covered and protected from dust, rain, etc.

Materials and/or equipment damaged during construction shall be replaced with new materials.

#### **FIRE DAMPERS:**

The contractor shall furnish and install UL555 rated 1-1/2 hour fire dampers at the locations indicated on the drawings in new ducts and sound attenuators. The contractor shall provide dampers with sleeves and angle frames necessary to comply with the manufacturer's UL installation requirements. Dampers for vertical or horizontal air flow shall be provided as required.

Fire damper shall be 100% free area and installed in wall and floor openings utilizing steel sleeves, angles, other materials and practice required to provide an installation equivalent to that utilized by the manufacturer when dampers are



tested by UL555. Installation shall be in accordance with the damper manufacturer's instructions.

Fire damper for rectangular ductwork and transfer openings shall be Ruskin type DIBD-B, Greenheck Model DFD-150-B, or prior approved equal.

Fire dampers for round ductwork shall be Ruskin Model DIBD-CR, Greenheck DFD-150-CR, or prior approved equal.

All fire dampers shall be installed per N.F.P.A. and U.L. requirements. Install U.L. approved sealant around the perimeter of the angle iron support at the sleeve and the wall in accordance with U. L. recommendations.

All fire dampers shall meet the latest Class 1 leakage requirements.

#### **EMERGENCY DRAIN PAN:**

Provide an emergency drain pan with Beckett Corp. Model 1502UR or Little Giant ACS-2 float switch interlocked with each respective air handling unit, Branch Circuit Controller, and Water Heater.

The pan shall be constructed of 18-gauge galvanized steel, extending 6" beyond each individual unit all around and turning up a minimum of 4" around the perimeter. A 1-1/4" x 1-1/4" x 1/8" galvanized angle iron frame shall be welded around the top of the pan. Entire pan should be painted with black asphalt rust preventative paint. Extend a Type "L" hard copper drain line (minimum 1") with ball valve and threaded plug as indicated on the drawings.

### **EXHAUST METAL DUCTWORK**

#### **GENERAL**

This Section includes low, medium, and high pressure rectangular, round, and flat-oval single/double wall metal ducts and plenums for heating, ventilating, exhaust, transfer, and air conditioning systems in pressure classes from minus 2-inches to plus 10-inches water gauge.

Duct Dimensions: All duct dimensions shown on drawings are interior metal to metal dimensions except where specifically indicated otherwise.

Duct Seal Class: Ducts shall be sealed in accordance with SMACNA "HVAC Duct Construction Standards

- Metal & Flexible" - 2nd Edition - 1995 with Addendums.

Flexible Duct & Connector: Where the specifications for connecting and supporting these in the SMACNA

- "HVAC Duct Construction Standards" are more restrictive or stringent, those requirements shall supersede these specifications.

#### **DEFINITIONS**

Sealing Requirements Definitions: For the purposes of duct systems sealing requirements specified in this Section, the following definitions apply:

Seams: A seam is defined as joining of two longitudinally (in the direction of airflow) oriented edges of duct surface material occurring between two joints. All other duct surface connections made on the perimeter are deemed to be joints.

Joints: Joints include girth joints; branch and sub-branch intersections; duct collar tap-ins; fitting subsections; louver and air terminal connections to ducts; access door and access panel frames and jambs; duct, plenum, and casing abutments to building structures.

Low Pressure - Up to and including 2 inches water column. Medium Pressure - Above 2 inches W.C. to 4 inches water column. High Pressure - Above 4 inches water column.

#### **SYSTEM PERFORMANCE REQUIREMENTS**

The duct system design, as indicated, has been used to select and size air moving and distribution equipment and other components of the air system.

Changes or alterations to the layout or configuration of the duct system, changes in duct sizes, routing, materials, connections, or other changes requested by the Contractor must be specifically approved in writing. Accompany requests for layout modifications shall be provided with calculations showing that the proposed layout will provide the original design results without increasing the system total pressure.

#### SUBMITTALS

General: Submit the following in accordance with the conditions of the specifications.

Product data including but not limited to details of construction relative to materials, dimensions of individual components, profiles, and finishes for the following items:

- Duct Sealant System.
- Sealing Materials.

Shop drawings from duct fabrication shop, drawn to a scale not smaller than 1/4 inch equals 1 foot, on drawing sheets which are the same size as the Contract Drawings, detailing the following:

Fabrication, assembly, and installation details, including plans, elevations, sections, details of components, details of floor, slab and wall penetrations, and attachments to other work.

Duct layout, indicating pressure classifications and sizes in plan view.

For exhaust ducts systems, indicate the classification of the materials handled as defined in this Section. Fittings.

Installation details of fire and combination fire/smoke dampers utilizing the damper manufacturer's recommended installation instructions as a guide.

Coordinate final installation details including opening sizes with Insulation Contractor, and Prime Contractor.

Installation details of equipment connections (air handlers, exhaust fans, etc.) Installation details of duct mounted access doors and/or panels.

Reinforcing details and spacing.

Seam and joint construction details.

Hangers and supports, including methods for building attachment, vibration isolation, and duct attachment.

#### QUALITY ASSURANCE

Duct Leakage Performance Tests: Refer to - "EXECUTION", - "Field Quality Control Duct Test and Testing Requirements"

Modify mock-up construction and perform additional tests as required to achieve specified minimum acceptable results.

Compliance: As a minimum, comply with the following NFPA & UL Standards:

181 - "Factory Made Air Ducts & Air Connectors".

UL 263 - "Fire Tests of Building Construction Materials".

NFPA 90A, "Standard for the Installation of Air Conditioning and Ventilating Systems," except as indicated otherwise.

#### DELIVERY, STORAGE, AND HANDLING

Deliver sealant and fire-stopping materials to site in original unopened containers or bundles with labels informing about manufacturer, product name and designation, color, expiration period for use, pot life, curing time, and mixing instructions for multi-component materials.

Deliver and store stainless steel sheets with mill-applied adhesive protective paper, maintained through fabrication and installation.

#### PRODUCTS

##### SHEET METAL MATERIALS

Sheet Metal, General: Provide sheet metal in thicknesses indicated, packaged and marked as specified in ASTM A 700 and elsewhere in these specifications.

Galvanized Sheet Steel: Lock-forming quality, ASTM A-653, ASTM A 924, Coating Designation G 90 (0.90 ounces of zinc per square foot of sheet with average nominal coating thickness of 0.76 mils per side - minimum coating is 0.54 mils). Provide mill phosphatized finish (paint grip galvanized) for surfaces of ducts exposed to view.

Unless specifically so indicated on Project Plans, ASTM A-653, Coating Designation G 60 is not permitted.

**Reinforcement Shapes and Plates:** Unless otherwise indicated, provide galvanized steel reinforcing where installed on galvanized sheet metal ducts. For aluminum and stainless steel ducts provide reinforcing of compatible materials.

**Tie Rods:** Galvanized steel, 1/4-inch minimum diameter for 36-inch length or less; 3/8-inch minimum diameter for lengths longer than 36 inches.

**Duct Finishes:** Where specifically indicated, provide the following finishes: Paint Grip

**Galvanized Finish:** Mill phosphatized galvanized steel.

**Plastic Coated Duct & Fittings:** G 60 Galvanized steel sheets covered with a polyvinyl chloride (PVC) plastic coating.

**Coating to be a minimum of 4 mil-thick (0.004 inch).**

**Coating to be heat sealed to both sides of metal duct (inside & out). Provide matching touch-up paint to be applied after assembly.**

#### SEALANT SYSTEMS AND SEALING MATERIALS

**Joint and Seam Sealants, General:** The term sealant used here is not limited to materials of adhesive or mastic nature, but also includes tapes and combinations of open-weave fabric strips and mastics.

**Available Manufacturers:** Subject to compliance with requirements, manufacturers offering products that may be incorporated in the Work include the following:

Hardcast, Inc. - Iron Grip 404 (Carlisle Coatings & Waterproofing)

Eco Duct Seal - 44-52

Precision - PA2084T

**Joint and Seam Tape:** 2 inches wide, glass-fiber-fabric reinforced.

**Tape Sealing System:** Woven-fiber tape impregnated with a gypsum mineral compound and a modified acrylic/silicone activator to react exothermically with the tape to form a hard, durable, airtight seal.

**Solvent-Based, Interior and Exterior, Joint and Seam Sealant:** One-part, non-sag, solvent-release-curing, polymerized butyl type sealant, complying with FS TT-S-001657, Type I; formulated with a minimum of 65 percent solids.

**System shall be UL 94PF listed and shall carry 0 flame spread and 0 smoke developed ratings.**

**System shall be UL 181B-M listed and 17NF listed for use with flexible duct systems or connectors.**

**Coverage shall be minimum of 20 mil thickness.**

**Viscosity shall be >300K cps.**

**Sealant shall pass 1/4 inch mandrel bend test.**

**Flanged Joint Mastics:** One-part, acid-curing, silicone elastomeric joint sealants, complying with ASTM C 920, Type S, Grade NS, Class 25, Use O.

**Flanged Gaskets:** Butyl rubber or EPDM polymer with polyisobutylene plasticizer.

#### HANGERS AND SUPPORTS

**Building Attachments:** Concrete inserts, powder actuated fasteners, or structural steel fasteners appropriate for building materials. Do not use powder actuated concrete fasteners for lightweight aggregate concretes or for slabs less than 4 inches thick.

**Hangers:** Galvanized sheet steel, or round, galvanized steel threaded rod.

**Straps and Rod Sizes:** Conform with Table 4-1, 4-1M, and 4-2 in SMACNA "HVAC Duct Construction Standards", Chapter 4 "Hangers and Supports"; Second Edition - 1995 with Addendum No. 1 dated November 1997, for sheet steel width and gage and steel rod diameters. Conform to SMACNA latest published editions and amendments.

**Duct Attachments:** Sheet metal screws, blind rivets, or self-tapping metal screws; compatible with duct materials.

**Trapeze and Riser Supports:** Steel shapes conforming to ASTM A 36.

**Supports for Galvanized-Steel Ducts:** Galvanized steel shapes and plates.

Supports for Stainless-Steel Ducts: Stainless steel support material.

Supports for Aluminum Ducts: Aluminum support materials unless materials are electrolytically separated from ducts.

#### ROUND DUCT FABRICATION:

Round Ducts – Fume Hood Exhaust:

18 gauge solid welded (continuous welded), uninsulated, type 316 stainless steel. Elbows shall be smooth radius (die formed) or minimum of 5-gore elbows. Joints along vertical riser and connection to exhaust fan shall be welded.

Type 316 stainless steel single wall spiral lockseam may be used where approved by Owner. Coordinate with Owner prior to ordering material.

#### EXTERNAL EXHAUST DUCT INSULATION:

Fume Hood Exhaust Duct (Above Suspended Ceilings) shall be wrapped on outside with 2.125" minimum thickness, 3/4# density, minimum installed R-value of R-6.0, fiberglass insulation with aluminum foil vapor barrier. Insulation shall be taped at all joints and installed per manufacturer's recommendations.

### EXECUTION

#### DUCT INSTALLATION, GENERAL

Duct System Pressure Class: Construct and install each duct system for the specific duct pressure classification indicated.

Sealing of Ductwork: Seal all ductwork. Seal classes shall be as specified in Table 1-2 of SMACNA "HVAC Duct Construction Standards, Metal and Flexible", Second Edition - 1995 with addendums.

Ducts are considered sealed when field pressure tests at maximum design operating pressure demonstrates a leakage rate of 10 percent of design cfm or less.

Sealing procedures shall be repeated as necessary until field tests verify a "sealed" duct system.

All exhaust air ductwork (round, oval or rectangular) shall be sealed in accordance with Seal Class A requirements regardless of the operating pressure specified.

Duct sealant systems utilized by the Contractor shall be installed in accordance with the manufacturer's published installation instructions.

Install ducts with the fewest possible joints.

Use fabricated fittings for all changes in directions, changes in size and shape, and connections.

Install couplings tight to duct wall surface with projections into duct at connections kept to a minimum.

Locate ducts, except as otherwise indicated, vertically and horizontally, parallel and perpendicular to building lines; avoid diagonal runs. Install duct systems in shortest route that does not obstruct useable space or block access for servicing building and its equipment.

Install ducts close to walls, overhead construction, columns, and other structural and permanent enclosure elements of building.

Provide clearance of 1 inch where furring is shown for enclosure or concealment of ducts, plus allowance for insulation thickness, if any.

Install insulated ducts with 1-inch clearance outside of insulation.

Conceal ducts from view in finished and occupied spaces by locating in mechanical shafts, hollow wall construction, or above suspended ceilings. Do not encase horizontal runs in solid partitions, except as specifically shown.

Coordinate layout with suspended ceiling and lighting layouts and similar finished work.

Electrical Equipment Spaces: Route ductwork to avoid passing through transformer vaults and electrical equipment spaces and enclosures.

Non-Fire-Rated Partition Penetrations: Where ducts pass interior partitions and exterior walls, and are exposed to view, conceal space between construction opening and duct or duct insulation with sheet metal flanges of same gage as duct. Overlap opening on 4 sides by at least 1-1/2 inches.

Fume Hood Exhaust Duct: Laps in duct construction shall be in direction of airflow. Horizontal duct shall be sloped down towards the fume hood (1/8 inch per foot). Construction and installation shall adhere to the latest SMACNA and NFPA standards.

#### HANGING AND SUPPORTING

Install rigid round, rectangular, and flat oval metal duct with support systems indicated in SMACNA "HVAC Duct Construction Standards," Second Edition - 1995 with addendums, Chapter 4, Tables 4-1 through 4-3 and Figures 4-1 through 4-10.

Support horizontal ducts within 2 feet of each elbow and within 4 feet of each branch intersection.

Support vertical ducts at a maximum interval of 16 feet and at each floor.

Upper attachments to structures shall have an allowable load not exceeding 1/4 of the failure (proof test) load but are not limited to the specific methods indicated.

Install powder actuated concrete fasteners after concrete is placed and completely cured.

#### CONNECTIONS

Equipment Connections: Connect equipment with flexible connectors in accordance with "Duct Accessories."

Branch Connections: As a minimum, comply with SMACNA "HVAC Duct Construction Standards," Second Edition - 1995 with addendums, Figures 2-5, 2-6, 3-4 and 3-5.

Outlet and Inlet Connections: As a minimum, comply with SMACNA "HVAC Duct Construction Standards," Second Edition - 1995 with addendums, Figures 2-14 through 2-18.

Terminal Units Connections: As a minimum, comply with SMACNA "HVAC Duct Construction Standards," Second Edition - 1995 with addendums, Figure 2-14 through 2-18.

90 deg Tees & Laterals: As a minimum, comply with SMACNA "HVAC Duct Construction Standards," Second Edition - 1995 with addendums, Figures 3-3, 3-4 and 3-5.

#### ADJUSTING AND CLEANING

Adjust volume control devices as required by the testing and balancing procedures to achieve required air flow. Refer to "TESTING, ADJUSTING, AND BALANCING" for requirements and procedures for adjusting and balancing air systems.

### TEMPERATURE CONTROLS

#### GENERAL

#### SCOPE OF WORK

Furnish a totally native BACnet-based Siemens Talon Native Bacnet Direct Digital Temperature Control System (DDC) including server graphics, schedules, alarms and trend logs on 100% outside air units, fume hood exhaust fans, canopy hood exhaust fan, and exhaust fan associated with snorkel system.

All controls must be standalone. All Siemens Talon Native Bacnet controls are to be tied in to the existing (BMS) server in Stephens Hall using a tridium Jace. Company Must be Tridium Certified and a certified Tridium distributor.

The System shall be used to display all graphics, schedules, alarms and trendlogs. Communications between the new controls and the existing Bacnet server shall be defined by using the protocols and network standards as defined by ANSI/ASHRAE Standard 135–2008, BACnet. In other words, all workstations and controllers, including unitary controllers, shall be Siemens Talon Native Bacnet devices.

No gateways shall be used for communication to controllers installed with the new (DDC) system.

Provide and install all hardware/software to allow for direct access to the (BMS) utilizing any standard web browser via the intranet and internet. The web browser shall be set up to access the (BMS) system via the local network or via the internet to allow for remote operation including scheduling, programming, data archiving, etc. Multiple users shall be able access the system simultaneously. All aspects of the user interface shall be via standard web browsers. Any computer used as operator interface shall not require the purchase of any special software from the manufacturer in order to provide the complete user interface as described herein. The user interface will be complete as described herein, providing complete tool sets, operational features, multi- panel displays, and other display features. Systems which merely provide HTML based web pages as the operator interface will not be acceptable. A BACnet Protocol Implementation Conformance Statement shall be provided for each controller device (master or slave) that will be supplied for this project. Wireless controls shall not be used.

#### QUALITY ASSURANCE

Contractor shall contact Barton Dupre with Select Building Controls (SBC)(337-447-0481, [barton@selectbuildingcontrols.com](mailto:barton@selectbuildingcontrols.com)) for all BACnet integration, graphic modifications, etc. associated with the connection to the existing campus workstation. All work by this contractor and SBC shall be included as part of this project.

The Contractor shall be responsible for installing wiring for the VRF equipment controls system. All work shall be coordinated with the Owner prior to installation.

#### REFERENCED STANDARDS, CODES AND ORDINANCES

It is the responsibility of the FMS contractor to be familiar with all codes, rules, ordinances, and regulations of the Authority Having Jurisdiction and their interpretations which are in effect at the site of the work.

The latest issue of applicable standards and recommended practices of the following agencies in effect shall form a part of the specification to the extent each agency's relative standards or recommended practices apply to the Systems and its components as specified herein.

1. Federal Communications Commission (FCC)
2. American National Standards Institute (ANSI)
3. American Society of Mechanical Engineers (ASME)
4. Electronic Industries Association (EIA)
5. Institute of Electrical and Electronics Engineers (IEEE)
6. National Electrical Manufacturers Association (NEMA)
7. National Fire Protection Association (NFPA)
8. Underwriters Laboratories (UL)
9. Occupational Safety and Health Administration (OSHA)
10. American Society of Heating, Refrigeration and Air Conditioning Engineers

This contractor shall be solely responsible for compliance with all health and safety regulations, performing the work in a safe and competent manner, and the use industry accepted installation procedures required for the work as outlined in these documents.

All systems equipment, components, accessories, and installation hardware shall be new and free from defects and shall be UL listed where applicable. All components shall be in current production and shall be a standard product of

the system or device manufacturer. Refurbished or reconditioned components are unacceptable. Each component shall bear the make, model number, device tag number (if any), and the UL label as applicable. All system components of a given type shall be the product of the same manufacturer.

## SUBMITTALS

Provide eight (8) copies of submittal data.

Submittals shall consist of:

- Data sheets of all products, including software and hardware.
- Valve schedule, including sizing calculations and actuator information.
- Damper schedule, including actuator information.
- Wiring and piping interconnection diagrams including panel and device power, and sources.
- List of materials of all proposed devices and equipment.
- Software documentation:
  - a. Sequence of operation, in text form.
  - b. Control layouts and shop drawings
- Point schedules
- Controls schematics and system diagrams

## PRODUCTS

### BUILDING MANAGEMENT SYSTEM GENERAL DESCRIPTION

The existing Native Bacnet (BMS) shall be the standard for use in this project; this system is currently in use by the end user and will be the basis for operating the new (DDC) system installed.

### TERMINAL UNIT APPLICATION CONTROLLERS

Provide one native BACnet application controller for each piece of unitary mechanical equipment that adequately covers all objects listed in object list for unit. All controllers shall interface to the existing building controller through MS/TP LAN using BACnet protocol. No gateways shall be used. Controllers shall include input, output and self-contained logic program as needed for complete control of unit. Provide all components, programming, devices, etc. to connect into the existing building controller.

#### BACnet Conformance

1. Application controllers shall, as a minimum, support MS/TP BACnet LAN types. They shall communicate directly using this BACnet LAN at 9.6, 19.2, 38.4 and 76.8 Kbps, as a native BACnet device. Application controllers shall be approved by the BTL as meeting the BACnet Application Specific Controller requirements and support all BACnet services necessary to provide the following BACnet functional groups:
  - a. Files Functional Group
  - b. Reinitialize Functional Group
  - c. Device Communications Functional Group
2. BACnet Functional Groups in the BACnet standard, for a complete list of the services that must be directly supported to provide each of the functional groups listed above. All proprietary services, if used in the system, shall be thoroughly documented and provided as part of the submittal data. All necessary tools shall be supplied for working with proprietary information.
3. Standard BACnet object types supported shall include, as a minimum, Analog Input, Analog Output, Analog Value, Binary Input, Binary Output, Binary Value, Device, File, and Program Object Types. All proprietary object types, if used in the system, shall be thoroughly documented and provided as part of the submittal data. All necessary tools shall be supplied for working with proprietary information.

Application controllers shall include universal inputs with 10-bit resolution that can accept 3K and 10K thermistors, 0–5VDC, 4–20mA, dry contact signals and a minimum of 3 pulse inputs. Any input on controller may be either analog or digital. Controller shall also include support and modifiable programming for interface to intelligent room sensor. Controller shall include binary outputs on board with analog outputs as needed.

All program sequences shall be stored on board controller in EEPROM. No batteries shall be needed to retain logic program. All program sequences shall be executed by controller 10 times per second and shall be capable of multiple PID loops for control of multiple devices. Programming of application controller shall be completely modifiable in the field over installed BACnet LANs or remotely through modem interface. Operator shall program logic sequences by graphically moving function blocks on screen and tying blocks together on screen. Application controller shall be programmed using same programming tools as building controller and as described in operator workstation section. All programming tools shall be provided and installed as part of system.

Application controller shall include support for intelligent room sensor (see Section 2.9.B.) Display on room sensor shall be programmable at controller and include an operating mode and a field service mode. All button functions and display data shall be programmable to show specific controller data in each mode based on which button is pressed on the sensor. See sequence of operation for specific display 2.6 requirements at intelligent room sensor.

## FIELD DEVICES

### ACTUATORS

1. Units for modulating service shall be analog electric (4-20mA or 0-10VDC) and shall be smooth and quiet in operation. In the event of power failure, actuators shall be provided with spring return so that they will "fail safe" in either normally open or normally closed position. All actuators shall be of sufficient size and power to operate control devices to which they are connected with 20% spare capacity. Use an individual actuator on each automatic valve or damper.

## FIELD SENSING DEVICES

Provide the following devices as required by the monitoring and control functions:

- |  |   |
|--|---|
| <ol style="list-style-type: none"> <li>1. START/STOP RELAY           <ol style="list-style-type: none"> <li>a. Power requirements</li> <li>Relay contacts</li> <li>Data</li> <li>Indication</li> <li>Override</li> </ol> </li> </ol> | 24 VAC at .015 amps<br>SPDT - 10 amps at 120 VAC<br>UL listed, CSA approved<br>LED - on when energized<br>built-in HOA switch |
|--|---|

## EXECUTION

### GENERAL

All work described in this section shall be mounted, terminated, circuit tested and calibrated by factory trained technicians and mechanics qualified for this work and in the regular employ of the installing contractor.

All temperature control and interlock wiring and cable shall be installed in accordance with approved wiring diagrams. Power or interlock wiring shall be run in separate conduit(s) from sensor wiring and cables.

Thermostats or sensors mounted on outside walls shall be mounted on 1" minimum thickness rigid fiberglass insulation base (or equal).

## INSTALLATION

All wiring, conduit and tubing shall be properly supported and run in a neat and workmanlike manner.

1. All wiring, conduit and tubing exposed in equipment rooms shall run parallel to or at right angles to the building



structure.

2. All piping and wiring within enclosures shall be neatly bundled and anchored to prevent restriction to devices and terminals.

The BMS contractor shall be responsible for all electrical installation which is necessary to a fully functional system. All wiring shall also be in accordance with applicable local and national codes.

1. All wiring in mechanical rooms shall be installed in conduit. Plenum rated cable is acceptable above ceilings and concealed locations.
2. Electrical power for control panels and the Operator Workstation shall be provided via dedicated circuits at a power panel specifically for controls.

#### Control wiring:

1. Include all low voltage wiring (100 volts and less) required for the BMS and temperature control systems under this section.
2. Conductors for control signals: No. 18 AWG copper conductors or larger as required.
  - a. Connector may be assembled in cable with PVC insulation minimum of 0.016 IN thick.
  - b. Cable outer sheathing as standard with manufacturer.
  - c. Line voltage wire for temperature control suitable for 600 volts, 168 deg. F temperature with Type THW plastic covering, minimum No. 18 AWG.
3. Conduit:
  - a. Conduit: Electrical metallic tubing or rigid.
  - b. Couplings: Compression.
  - c. Flexible conduit: Steel armor or sealtight.
4. Supporting devices:
  - a. Conduit supports
    - 1.) Must conform to seismic restraint criteria established by governing authority.
    - 2.) Single runs: Galvanized conduit straps or ring bolt type hangers with specialty spring clips. Do not use plumber's perforated straps.
    - 3.) Multiple runs: Conduit rack with 25 percent spare capacity.
    - 4.) Vertical runs: Channel support with conduit fittings.
  - b. Anchor methods:
    - 1) Hollow masonry: Toggle bolts or spider type expansion anchors.
    - 2) Solid masonry: Lead expansion anchors or precast inserts.
    - 3) Metal surfaces: Machine screws, bolts, or welded studs.
    - 4) Wood surfaces: Wood screws.
    - 5) Concrete surfaces: Self drilling anchors or power driver studs.

#### Equipment

1. Temperature sensing wells:
  - a. Provide list with shop drawing(s) of well locations to mechanical contractor.
2. In general, locate temperature sensors, humidity sensors, thermostats and humidistats for room control immediately inside of door, above light switch, or where shown. Comply with applicable ADA regulations.
3. Mount local control panels at convenient locations adjacent to equipment served.
  - a. Mount all relays, transformers, controllers, pressure switches, etc., internal to the temperature control panels
4. Mounting of field microprocessors (ASC's) directly on air handling units shall not be allowed.

#### STARTUP/COMMISSIONING

The controls contractor shall include 8 hours to review the operation of the system including sequences, recommend energy saving strategies, and optimization techniques for the system. The review comments shall be included in typewritten format and should be included in the test and balance contractors report for implementation by the owner.

Control system to be set up and checked out by factory trained competent technicians skilled in the setting and adjustment of BMS equipment used in this project. All technicians shall be experienced in the type of systems associated with the existing (BMS).

#### TRAINING

Provide a minimum of 8 hours of instructions to Owner's personnel in the operation and maintenance of the control system. Provide training after the system has been installed and checked out.

## WARRANTY

At completion of final test of installation and acceptance by Owner, provide any service incidental to proper performance for a period of one year.

Equipment shall be warranted for one year (including defects in workmanship and material) under normal use and service. During warranty period supplier shall also replace or repair, free of charge, any equipment proven to be defective in workmanship or material.

Certain electronic devices not manufactured by the BMS supplier shall carry the original manufacturer's warranty. Pass any registration and warranty documents and warranty rights to the Owner.

## SEQUENCES OF OPERATIONS

**Contractor shall furnish and install control panels and equipment as required to accommodate work associated with Phase 1 and Phase 2.**

**Equipment installed in Phase 1 shall be completely operational with the intension of expanding the control system to incorporate work noted as Phase 2.**

### Exhaust Systems:

#### Snorkel Exhaust Fan:

Phase 1: Fan starter shall receive a digital signal from a wall mounted switch located adjacent to the starter. Programming shall be such that the fan shall exhaust when hood switch is in the "ON" position.

Phase 1: Provide and install current sensor at exhaust fan for BMS to monitor fan status.

Phase 2 – N.I.C.: A room pressure monitoring system shall energize the snorkel exhaust fan when the room pressure is positive relative to adjacent space. There shall be an adjustable time delay prior to initiating this sequence of operation.

Phase 2 – N.I.C.: A gas monitor system shall energize the snorkel exhaust fan when the gas monitor senses any one of four gases (M, H, N, and/or CO<sub>2</sub>). There shall be an adjustable time delay prior to initiating this sequence of operation.

#### Canopy Hoods Exhaust Fan:

Phase 1: Fan VFD shall receive a digital signal from a wall mounted switch located adjacent to the VFD. Programming shall be such that the fan shall exhaust when hood switch is in the "ON" position.

Phase 1: Provide and install current sensor at exhaust fan for BMS to monitor fan status.

Phase 2: A room pressure monitoring system shall energize the canopy hoods exhaust fan when the room pressure is positive relative to adjacent space. There shall be an adjustable time delay prior to initiating this sequence of operation.

Phase 2: A gas monitor system shall energize the canopy hoods exhaust fan when the gas monitor senses any one of four gases (M, H, N, and/or CO<sub>2</sub>). There shall be an adjustable time delay prior to initiating this sequence of operation.

#### Fume Hood Exhaust Fans:

Phase 1: Fan VFD shall receive a digital signal from a switch installed on its associated hood. Fan shall exhaust when hood switch is in the "ON" position. The VFD shall be set at a speed associated with a fixed air flow rate. The VFD when energized shall ramp up to the set speed.

Phase 1: Provide and install current sensors at all exhaust fans for BMS to monitor fan status.

**Dedicated Outside Air Systems (DOAS):****Phase 1:**

Dedicated outside air System units shall completely dehumidify outside air thru the cooling coil and reheat the air thru the hot gas reheat coil and deliver neutral air to the space at setpoint temperature (72 degrees F – Adjustable).

Each DOAS Unit shall be interlocked with a specific fume hood (e.g.: EF-2-1 with Hood #1, EF-2-2 with Hood #2, etc.).

When a Fume Hood exhaust fan switch is put in the "ON" position, a signal shall be sent to the respective exhaust fan VFD, the contact in the VFD shall close a contact in the VRF Ceiling Cassette that shall energize the respective DOAS Motor Operated Damper (MOD). The MOD shall be located in the intake duct for each DOAS AHU. When the contact on the MOD End Switch is made, the DOAS unit shall start and the Fume Hood exhaust fan VFD shall start and ramp up to a speed setpoint set to the required hood exhaust air flow requirements.

The BAS shall use BACNET to monitor the DOAS unit(s).

BAS monitoring points shall be similar to the monitoring points on the existing Madison Hall Room 112 DOAS Unit monitoring points.

Graphics shall be incorporated on the BMS front end located in Parker Hall.

Contractor shall install wall signs notifying the owner of the switch operation and associated interlocks.

**Room Pressure Monitor/Control System:**

Phase 2: A room pressure monitor system shall be relocated from Madison Hall Room 122 to Abdalla Hall Room 201. The room pressure monitor system shall sense the differential pressure between Room 201 and the corridor. The monitor shall have local horn/strobe alarms and shall be tied into the existing BMS.

Phase 2: When the room pressure monitor system senses a positive pressure within the lab space (room 201) for over 10 minutes, it shall initialize local alarms and alarm the BMS. Contractor shall provide all components and programming required to tie into existing BMS.

**Room Gas Monitor System:**

Phase 2: A 4-gas monitor system shall be relocated from Madison Hall Room 112 to Abdalla Hall room 201. The gas monitoring system shall have a local horn/strobe to tie into and alarm the existing BMS (basis of design – Redball OI-6000K Gen II Sensor Assembly Kit). The gas Monitor system shall signal an alarm upon detection of concentrations of harmful gases above set point. The gas monitoring system shall be properly calibrated in accordance with the manufacturer's recommendations.

**Room Relative Humidity:**

Phase 1: A Relative Humidity Sensor shall be located on the wall in room 201. The relative Humidity within the space shall be monitored. When the Room Relative Humidity gets above setpoint (65% RH – Adjustable) the BMS shall send an alarm to service the DOAS Units within the space.

**I/O POINT SCHEDULE:**

DI	Exhaust Fan EF-2-1 (Hood #1) – Status (CT Sensors) (Alarmable) – Phase 2
DI	Exhaust Fan EF-2-2 (Hood #2) – Status (CT Sensors) (Alarmable) – Phase 2
DI	Exhaust Fan EF-2-3 (Hood #3) – Status (CT Sensors) (Alarmable) – Phase 2
DI	Exhaust Fan EF-2-4 (Hood #4) – Status (CT Sensors) (Alarmable) – Phase 2
DI	Exhaust Fan EF-2-5 (Hood #5) – Status (CT Sensors) (Alarmable) – Phase 1
DI	Exhaust Fan EF-2-6 (Hood #6) – Status (CT Sensors) (Alarmable) – Phase 1
DI	Exhaust Fan EF-2-7 (Hood #7) – Status (CT Sensors) (Alarmable) – Phase 1
DI	Exhaust Fan EF-2-8 (Hood #8) – Status (CT Sensors) (Alarmable) – Phase 1
DI	Exhaust Fan EF-2-9 (Canopy Hoods) – Status (CT Sensors) (Alarmable) – Phase 1
DI	Exhaust Fan EF-2-10 (Snorkels) – Status (CT Sensors) (Alarmable) – Phase 1
DO	Hood #1 / EF-2-1 Switch – Phase 2
DO	Hood #2 / EF-2-2 Switch – Phase 2
DO	Hood #3 / EF-2-3 Switch – Phase 2
DO	Hood #4 / EF-2-4 Switch – Phase 2
DO	Hood #5 / EF-2-5 Switch – Phase 1
DO	Hood #6 / EF-2-6 Switch – Phase 1
DO	Hood #7 / EF-2-7 Switch – Phase 1
DO	Hood #8 / EF-2-8 Switch – Phase 1
DO	Canopy Hoods / EF-2-9 Switch – Phase 1
DO	Snorkels / EF-2-10 Switch – Phase 1
DI	DOAS Unit #1 / M.O.D. – Phase 2
DI	DOAS Unit #2 / M.O.D. – Phase 2
DI	DOAS Unit #3 / M.O.D. – Phase 2
DI	DOAS Unit #4 / M.O.D. – Phase 2
DI	DOAS Unit #5 / M.O.D. – Phase 1
DI	DOAS Unit #6 / M.O.D. – Phase 1
DI	DOAS Unit #7 / M.O.D. – Phase 1
DI	DOAS Unit #8 / M.O.D. – Phase 1
AO	Gas Monitor (Room 201) (Alarmable) – Phase 2
AO	Room Pressure Monitor (Room 201) (Alarmable) - Phase 2
AI	Room Relative Humidity (Room 201) (Alarmable) – Phase 1

The contractor shall collaborate with the owner directly to determine the owner's preference for naming conventions, etc. before entering the data into the system.

Refer to details for additional points.

**TESTING, ADJUSTING AND BALANCING****PART 1: GENERAL****1.01 RELATED DOCUMENTS**

- A. All specification sections, drawings, and general provisions of the contract apply to work of this section, as do other documents referred to in this section.

**1.02 SCOPE OF WORK**

- A. The Contractor shall obtain the services of an independent Test and Balance (TAB) Company which specializes in the testing and balancing of heating, ventilating and air conditioning (HVAC) systems to test, adjust and balance all HVAC systems in the building(s). Work associated with Outside Air and Exhaust Systems shall be tested and balanced as part of the scope of the project.
- B. The work included in this section consists of furnishing labor, instruments, and tools required in testing,

adjusting, and balancing the HVAC systems as described in these specifications or shown on accompanying drawings. Services shall include checking equipment performance, taking the specified measurements, and recording and reporting the results. The testing, adjusting and balancing agency shall act as a reporting agency; that is, list and report each piece of equipment as to identification number, manufacturer, model number, serial number, proper location, specified performance, and report actual performance of all equipment as found during testing. The report is intended to be used during the life of the building as a ready reference indicating original conditions, equipment components, etc.

- C. Representatives of the Test and Balance Company shall visit the job site during installation of the HVAC equipment, piping and ductwork as required.
- D. Upon completion of the HVAC system installation, the Test and Balance Company shall perform all required testing and balancing with the full cooperation of the Contractor and his Sub-contractors. The Contractor shall make changes and/or adjustments to the HVAC system components that are required by the Test and Balance Company to accomplish proper balancing. The TAB agency shall not supply or install any materials or balancing devices such as pulleys, drives, belts, etc. All of this work is by the Contractor and shall be performed at no additional cost to the Owner.
- E. The test and balance report complete with a summary page listing all deficiencies shall be submitted to the Owner for review. If the Owner agrees with the report, he shall sign it and return it to the Contractor. The test and balance report must be complete and must be accepted by the Owner prior to acceptance of the project. Any outstanding test and balance items shall be placed on the punch list and a monetary value shall be assigned to them.
- F. After all deficiencies have been corrected the Owner shall sign the testing and balancing report, and the Test and Balance Company shall supply four (4) copies of the final and complete report to the Contractor for inclusion in the Operation and Maintenance Manuals.
- G. The Test and Balance Company shall obtain a copy of all HVAC related shop drawings from the contractor. The contractor shall provide a set of approved shop drawings to the TAB contractor within 30 days from receiving approved shop drawings.
- H. The items requiring testing, adjusting, and balancing include (but are not restricted to) the following:

AIR SYSTEMS:

Supply Fan AHU  
Branch and Main ducts  
Diffusers, Registers, Grilles and Dampers  
Exhaust Systems

1.03 DEFINITIONS, REFERENCES, STANDARDS

- A. All work shall be in accordance with the latest edition of the Associated Air Balance Council (AABC) National Standards or the latest standards of the National Environmental Balancing Bureau (NEBB). If these contract documents set forth more stringent requirements than the AABC National Standards or the NEBB Standards, these contract documents shall prevail.

1.04 QUALIFICATIONS

- A. Agency Qualifications: The TAB Agency shall be a current member of the AABC or the NEBB and must be in good standing with FP&C. A list of these firms shall be obtained from FP&C. Falsification of a TAB report shall be grounds for removal from the FP&C list and the firm's actions shall be reported to the appropriate certification agency. The contractor may use any FP&C approved TAB firm on a state project.

1.05 SUBMITTALS

- A. Procedures and Agenda: The TAB agency shall submit the TAB procedures and agenda proposed to be used.
- B. Sample Forms: The TAB agency shall submit sample forms, which shall include the minimum data required

by the AABC National Standards or the NEBB Standards.

#### 1.06 TAB PREPARATION AND COORDINATION

- A. Shop drawings, submittal data, up-to-date revisions, change orders, fan curves, pump curves and other data required for planning, preparation, and execution of the TAB work shall be provided when available and no later than 30 days after the Designer has returned the final approved submittal data to the Contractor.
- B. System installation and equipment startup shall be complete prior to the TAB agency's being notified to begin.
- C. The building control system (BCS) contractor shall provide and install the control system, including all temperature, pressure, and humidity sensors. These shall be calibrated for accurate control. If applicable, the BCS contractor shall install all necessary computers and computer programs and make these operational. Assistance shall be provided as required for reprogramming, coordination, and problem resolution.
- D. All test points, balancing devices, identification tags, etc., shall be accessible and clear of insulation and other obstructions that would impede TAB procedures.
- E. Qualified installation or startup personnel shall be readily available for the operation and adjustment of the systems. Assistance shall be provided as required for coordination and problem resolution.

#### 1.07 REPORTS

- A. Final TAB Report - The TAB agency shall submit the final TAB report for review by the Owner. On plans provided, all outlets, devices, HVAC equipment, etc., shall be identified (including manufacturer, model number, serial number, motor manufacturer, HP, drive type, fan and motor sheaves and belt number), along with a numbering system corresponding to report unit identification. The TAB agency shall submit an AABC "National Project Performance Guaranty" (or similar NEBB Guaranty) assuring that the project systems were tested, adjusted, and balanced in accordance with the project specifications and AABC National Standards (or similar NEBB Standards). The Designer shall certify his approval on the Performance Guaranty.
- B. Submit 4 copies of the Final TAB Report to the Contractor for inclusion in the Operation and Maintenance Manuals.

#### PART 2: INSTRUMENTATION

- A. All instruments used for measurements shall be accurate and calibrated. Calibration and maintenance of all instruments shall be in accordance with the requirements of AABC National Standards (or similar NEBB Standards).

#### PART 3: EXECUTION

##### 3.01 GENERAL

- A. The specified systems shall be reviewed and inspected for conformance to design documents. Testing, adjusting, and balancing on each identified system shall be performed. The accuracy of measurements shall be in accordance with AABC National Standards (or similar NEBB Standards). Adjustment tolerances shall be: AHU Air Flow (CFM) -5% to +5%, Diffuser Air Flow (CFM) -10% to +10%, Outside Air Flow (CFM) -5% to +5%, Exhaust -2.5% to +2.5%, Temperatures at thermostats (space sensors) -1 degree F. To +1 degree F., DB/WB Temperatures on coils -1 degree F to +1 degree F., Humidity at Humidity sensors -1% RH to +1% RH, Water Temperatures -1 degree F. To +1 degree F., Air Pressures -0.01" WC to +0.01" WC taken with inclined manometer, Water Pressures -1 PSIG to +1 PSIG taken with Bourdon Gauge with scale 0 to 100 PSIG, Water Pressures -0.5' to +0.5' taken with Digital Pressure Differential Meter, other tolerances shall be + or - 10% unless otherwise stated.

- B. Equipment settings, including manual damper quadrant positions, valve indicators, fan speed control levers, and similar controls and devices shall be marked to show final settings.
- C. All information necessary to complete a proper TAB project and report shall be per AABC or NEBB standards unless otherwise noted. The descriptions of work required, as listed in this section, are a guide to the minimum information needed.
- D. TAB contractor shall cut insulation, ductwork and piping for installation of test probes to the minimum extent necessary to allow adequate performance of procedures. Upon completion, patch insulation, ductwork and housings using materials identical to those removed. Seal insulation to reestablish integrity of the vapor barrier.
- E. TAB work shall include additional inspection and adjustment of components during the season following the initial balance to include re-balance of any items influenced by seasonal changes or as directed by the Owner.

### 3.02 AIR SYSTEMS

- A. The TAB agency shall verify that all ductwork, splitters, extractors, dampers, grilles, registers, and diffusers have been installed per design, are functional and set full open. Any leakage in the ductwork shall be repaired prior to the test. The TAB agency shall perform the following TAB procedures in accordance with the AABC National Standards or NEBB Standards:

For supply fans (AHU):

1. Fan speeds - Test and adjust fan RPM to achieve design CFM requirements.
2. Current and Voltage - Test and record each motor line voltage and amperage. Compare data with the nameplate limits to ensure motors are not in or above the service factor, are not excessively below FLA, or are not operating with a line voltage exceeding required tolerances. Make corrections as deemed necessary by Owner.
3. Pitot-Tube Traverse - Perform a Pitot-tube traverse of main supply and return ducts, as applicable to obtain total CFM. If a Pitot-tube traverse is not practical, an explanation of why a traverse was not made must appear on the appropriate data sheet.
4. Outside Air - Test and adjust the outside air on applicable equipment using a Pitot-tube traverse. If a traverse is not practical, an explanation of why a traverse was not made must appear on the appropriate data sheet. If a traverse is not practical use the mixed-air temperature method if the inside and outside temperature difference is at least 20 degrees Fahrenheit or use the difference between Pitot-tube traverses of the supply and return air ducts.
5. Static Pressure - Test and record system static pressure, including the static pressure profile of each supply fan.

For branch and main ducts:

1. Adjust ducts to within design CFM requirements. As applicable, at least one zone balancing damper shall be completely open. Multi-diffuser branch ducts shall have at least one outlet or inlet volume damper completely open.

For diffusers, registers and grilles:

1. Tolerances - Test, adjust, and balance each diffuser, grille, and register to within 10% of design requirements. Minimize drafts. Include required CFM, initial test CFM and final CFM.
2. Identification - Identify the type, location, and size of each grille, diffuser, and register. This information shall be recorded on air outlet data sheets.

### 3.03 ADDITIONAL TAB SERVICES

- A. Job Site Inspections:  
During construction, the TAB agency shall inspect the installation of pipe systems, sheet metal work, temperature controls, and other component parts of the HVAC systems as required.
- B. TAB Report Verification:  
At the time of final inspection, the TAB agency may be required to recheck, in the presence of the owner's representative, specific and random selections of data, air quantities, and air motion recorded in the certified report. Points and areas for recheck shall be selected by the owner's representative. Measurements and test procedures shall be the same as approved for the initial work for the certified report. Selections for recheck, specific plus random, will not exceed 10% of the total number tabulated in the report.

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## ELECTRICAL GENERAL CONDITIONS

### PART 1 – GENERAL

#### ALL WORK SHALL BE BY A LICENSED AND/OR CERTIFIED ELECTRICIAN.

OWNER RESERVES THE RIGHT TO REJECT ANY AND ALL UNQUALIFIED PERSONNEL ON THE PROJECT. ALL ELECTRICAL WORK SHALL BE EITHER COMPLETED BY OR INSPECTED BY A JOURNEYMAN ELECTRICIAN BEFORE ENERGIZING ANY CIRCUITS. NO WORK SHALL BE DONE ON LIVE ELECTRICAL CIRCUITS WITHOUT CONSENT OF THE OWNER. OWNER SHALL BE NOTIFIED TO COMPLETE ALL OPEN WALL OR ABOVE CEILING INSPECTIONS. ELECTRICAL CONTRACTOR SHALL BE EXPECTED TO FOLLOW THE UNIVERSITIES LOCK OUT PROCEDURE.

#### ELECTRICAL NOTES:

#### ELECTRICAL NOTES - PHASE 1:

FURNISH AND INSTALL ALL PANELS, BREAKERS IN PANELS, WIRING, CONDUIT, EXTRA CONDUIT LEAVING PANELS (CALLED FOR AT EACH PANEL SCHEDULE), DISCONNECTS, MOTOR RATED SWITCHES, RECEPTACLES, SWITCHES, COVER PLATES, TABLETOP PEDESTALS FOR RECEPTACLES, SPECIAL RECEPTACLES AND PLUGS, SPECIAL RECEPTACLES AND PLUGS AT AND ASSOCIATED HOODS 5, 6, 7, & 8, AND ALL OTHER SPECIAL RECEPTACLES AND PLUGS CALLED FOR IN THE PLANS.

FURNISH AND INSTALL ALL CONDUIT ONLY FROM PANELS TO PHASE 2 EQUIPMENT (NO WIRING, DISCONNECTS, MOTOR RATED SWITCHES, ETC) UNLESS OTHERWISE NOTED. FOR PHASE 2 CONDENSERS OUTSIDE, PROVIDE BREAKERS ONLY, NO CONDUIT OR WIRING.

FOR ALTERNATES NO.1, NO.2, & NO.3- SEE PLAN SHEET AL1.

#### PHASE 1 ELECTRICAL CONSISTS OF:

ALL ELECTRICAL WORK IN ROOM 201 BELOW CEILING, ABOVE CEILING, VFD's, AND NEW FANS ON ROOF RELATING TO FUME HOODS #5, #6, #7, #8, SNORKELS AND SNORKEL TABLE, AND CANOPY HOODS AND CANOPY HOOD TABLE IS IN PHASE 1.

ALL CONDUIT IN WALLS, CHASES, AND TO ROOF IS IN PHASE 1.

PHASE 2 HOODS AND FANS ELECTRICAL WIRING AND DISCONNECTS ARE IN PHASE 2. ALL CONDUIT TO PHASE 2 EQUIPMENT IS IN PHASE 1. ALL CIRCUIT RACEWAYS FOR PHASE 2 HVAC EQUIPMENT FROM NEW ELECTRICAL PANELS



SHALL BE EXTENDED TO EQUIPMENT LOCATION ABOVE CEILING FROM PANELS IN PHASE 1. RACEWAYS FOR ROOF EQUIPMENT SHALL RUN TO EQUIPMENT LOCATION ON ROOF.

ALL RACEWAYS TO AND FROM "J" BOXES FOR HVAC EQUIPMENT, ETC. ON CHASE WALL IS IN PHASE 1 OR AS NOTED ON PLANS.

WHERE PHASE 2 EQUIPMENT IS LOCATED ON WALLS, CONTRACTOR SHALL ROUGH-IN CONDUIT TO ALLOW ALL WALLS TO BE FINISHED AND PAINTED. ALL CONDUIT SHALL BE IN WALLS WITH THE EXCEPTION OF POWER FEED TO EQUIPMENT AT EXISTING BLOCK WALLS, THEN WIRE MOLD SHALL BE INSTALLED FOR EXPOSED RACEWAYS.

PROVIDE BOXES FOR RECEPTACLES, LIGHTS, AND DATA OUTLETS IN WALLS AND CEILINGS. PROVIDE BOXES IN WALLS FOR A/C THERMOSTATS.

INSTALL BOXES IN WALLS FOR DATA DROPS WHERE SHOWN. CONTRACTOR SHALL PULL BLUE, CAT-6 CABLING FROM EACH DROP TO DATA CLOSET 203B. PROVIDE A MINIMUM OF 10' SLACK PER DROP IN DATA CLOSET FOR SWITCHGEAR HOOK UP. PROVIDE ADEQUATE SLACK PER DATA DROP BOX IN WALLS FOR DEVICE HOOK UP. LABEL BOTH ENDS OF EACH CABLE OF LOCATION. FURNISH AND INSTALL ALL DATA EQUIPMENT FOR A COMPLETE DATA SYSTEM. PROVIDE A 2" PVC CONDUIT WITH SPARE PULL STRING AND FIBER CABLE FROM LUS PEDESTAL TO DATA CLOSET 203B.

ALL DEVICES, EQUIPMENT, FINAL TERMINATIONS, AND TESTING BY THIS CONTRACTOR. COORDINATE WITH LUS AND THE UNIVERSITY FOR CONNECTIONS. CONTRACTOR SHALL PAY ALL FEES ASSOCIATED WITH LUS TIE IN.

FURNISH AND INSTALL ALL MATERIALS AND LABOR FOR EXIT LIGHTS, EMERGENCY LIGHTS, LIGHT FIXTURES, SWITCHES, RECEPTACLES, SWITCHGEAR, AND WIRING FOR A COMPLETE SYSTEM AS CALLED OUT ON THE PLANS.

RELOCATE EXISTING 240 VOLT, 200 AMP BUSS DUCT FUSIBLE DISCONNECT WHERE SHOWN. PROVIDE REQUIRED FUSES IN DISCONNECT.

RELOCATE (2) EXISTING 208 VOLT, 200 AMP BUSS DUCT FUSIBLE DISCONNECT WHERE SHOWN. PROVIDE REQUIRED FUSES IN DISCONNECT.

FURNISH AND INSTALL A NEW NEMA-3R, 208/3/60 42 SPACE, PANEL BOARD WITH 200 AMP MAIN BREAKER (LABELED PANEL "LZ-B") ON UNISTRUT ON EXTERIOR WALL FOR NEW OA-HR CONDENSER UNITS WHERE SHOWN FED FROM EXISTING RELOCATED DISCONNECT ON BUSS DUCT. INSTALL (9) 50 AMP, 3-POLE BREAKERS, AS PER PANEL "LZ-B" SCHEDULE. RUN A 1" RIGID CONDUIT FROM PANEL "LZ-B" ON WALL THEN DOWN TO EACH UNIT AND TURN UP INSIDE UNIT FROM BOTTOM PANEL OF UNIT. COORDINATE WITH MECHANICAL CONTRACTOR FOR ROUTING AND POSSIBLY UTILIZING PIPE SUPPORTS. RUN (3) #8L, (1) #8N, AND (1) #6G TO EACH UNIT IN PHASE 1. INSTALL A 120 VOLT RECEPTACLE BENEATH THE PANEL IN A WATERPROOF BOX. PROVIDE A 20 AMP BREAKER IN PANEL. PROVIDE ALL BREAKERS IN PANEL AS PER PANEL SCHEDULE IN PHASE 1. LABEL PANEL DIRECTORY.

FURNISH AND INSTALL A NEW NEMA-1, 208/3/60, 200 AMP, 84 SPACE SINGLE SECTION, RECESSED PANEL BOARD WITH 200 AMP MAIN BREAKER (LABELED PANEL "LZ") ON WALL WHERE SHOWN IN ROOM 201. PROVIDE ALL BREAKERS SHOWN ON PANEL SCHEDULE. LABEL PANEL DIRECTORY AS SUCH.

FURNISH AND INSTALL A NEMA-1, 240/3/60, 200 AMP, 84 SPACE SINGLE SECTION, RECESSED PANEL BOARD WITH 200 AMP MAIN BREAKER (LABELED PANEL "LZ-A") ON WALL WHERE SHOWN IN ROOM 201. PROVIDE ALL BREAKERS SHOWN ON PANEL SCHEDULE. LABEL PANEL DIRECTORY AS SUCH.

FURNISH AND INSTALL NEW 4" x 4" x 2" DEEP POWER PEDESTAL BOXES ( PP ) ON TOP OF TABLE TOP AS SHOWN ON PLANS. POWER PEDESTALS SHALL HAVE QUAD-PLEX RECEPTACLES WITH BRASS TAB REMOVED TO ALLOW (4) 20 AMP OUTLETS PER PEDESTAL WITH STAINLESS STEEL COVER PLATES. INSTALL (14) 240V SPECIAL RECEPTACLES AND PLUGS

AND (3) UNITS HARDWIRED (HARDWIRE PEDESTALS SHALL HAVE S.S. COVER PLATE WITH 90° FLEX FITTINGS) (SEE PANEL SCHEDULE) AS SHOWN FOR 240 VOLT CIRCUITS. PROVIDE NOTED SPECIAL RECEPTACLES AND PLUGS FOR NOTED BOXES FOR EQUIPMENT. THE UNIVERSITY SHALL LOCATE EACH PEDESTAL BOX. CABINET TOP HOLES SHALL BE DRILLED BY MANUFACTURER TO RECEIVE 3/4" NIPPLE FROM BOX. ALL CIRCUITS SHALL RUN FROM NEW 240 VOLT PANEL THROUGH FLOOR SLAB AT CHASE WALL AND OVER TO AND ABOVE ROOM 169 CEILING THEN UP THROUGH FLOOR SLAB IN CABINET UTILITY CHASE. SEAL ALL PENETRATIONS.

PROVIDE SPECIAL RECEPTACLES AND PLUGS FOR 240 VOLT CIRCUIT AT HOODS #5, #6, AND #7. RUN CIRCUIT ABOVE CEILING THEN TRANSITION TO WIRE MOLD FROM CEILING TO TOP OF HOOD AND EXTEND TO FACE OF HOOD ABOVE HOOD SWITCH AND INSTALL WIRE MOLD BOX WITH RECEPTACLE AND INSTALL PLUG ON EQUIPMENT.

PROVIDE A TOTAL OF (14) 240V SPECIAL RECEPTACLES AND PLUGS. INSTALL PLUGS ON EQUIPMENT & CONNECT.

RUN EXISTING FAN #17 480 VOLT CIRCUIT WHERE SHOWN AND INSTALL EXISTING DISCONNECT REMOVED FROM ROOF FAN. INSTALL 20 AMP FUSES IN DISCONNECT AND HARDWIRE ARBIN EQUIPMENT TO DISCONNECT. PROVIDE 240 VOLT RECEPTACLE AND PLUG FOR SAME EQUIPMENT. RUN ALL POWER IN NEW CHASE WALL AS SHOWN.

PROVIDE NEW 20-AMP RECEPTACLES AND STAINLESS-STEEL COVER PLATES FOR NEW AND EXISTING OUTLETS.

MC CABLE ACCEPTABLE WHERE APPLICABLE.

ALL LOW VOLTAGE RACEWAYS BEHIND CHASE WALL TO EQUIPMENT MOUNTED ON CHASE WALL SHALL BE EMT.

PROVIDE (2) 2" CONDUIT SLEEVES THROUGH FLOOR CENTER OF EACH TABLE CHASE AT FUEL CELL TABLE AND SNORKEL TABLE FOR FUTURE CABLE PASSAGE.

NOTE THAT THE EXISTING LIGHT FIXTURES SHALL BE INSTALLED IN A DIFFERENT LOCATION AND THIS CONTRACTOR SHALL COORDINATE AS SUCH. CONTRACTOR SHALL PROVIDE ALL MATERIALS AND LABOR TO RELOCATE THE EXISTING LIGHT FIXTURES. RELOCATED LIGHT FIXTURES SHALL REMAIN ON ITS ORIGINAL CIRCUIT AND SWITCH. SEE CEILING PLAN FOR REFERENCE.

FURNISH AND INSTALL NEW 20 AMP WALL SWITCHES WITH STAINLESS STEEL COVER PLATES AT EXISTING SWITCH LOCATION.

FURNISH AND INSTALL NEW 20-AMP RECEPTACLES FOR ALL NEW AND EXISTING RECEPTACLES WITH STAINLESS STEEL COVER PLATES.

MC CABLE ACCEPTABLE WHERE PERMISSIBLE.

FURNISH AND INSTALL ALL WIRING, CONDUIT, AND NEW MOTOR RATED SWITCHES, SWITCHES REQUIRED FOR THAT VOLTAGE, AT DOAS UNITS DOAS 5, DOAS 6, DOAS 7, AND DOAS 8. DOAS 1, DOAS 2, DOAS 3, AND DOAS 4 ARE IN PHASE 2. RUN CONDUIT ONLY TO THESE.

PROVIDE ONE (1) MOTOR RATED SWITCH FOR EACH DOAS UNIT AND ONE (1) FOR EACH BC UNIT. CONNECT TO NEW CIRCUIT IN PANEL "LZ" AS SHOWN ON PANEL SCHEDULE. PROVIDE A "JP" (JUNCTION BOX WITH 208/1/60 #8AWG CIRCUIT WIRING FOR AHU MANUFACTURER SUPPLIED TRANSFORMER) ADJACENT TO MOTOR RATED SWITCHES. TRANSFORMER INSTALLED BY OTHERS.

## 1.1 DESCRIPTION

A. The General Conditions and all pertinent sections are a part of this specification, and the Contractor shall consult them in detail for instructions pertaining to his work. He shall consult all other sections of the specifications to determine if he is required to perform any work relative to that particular section.

## 1.2 SCOPE OF WORK

A. The work contemplated under this specification comprises the furnishing of all labor and materials required and necessary for the complete installation of electrical wiring in conduit for lighting control and power from the various panelboards to each ultimate outlet hereinafter specified and/or shown on the accompanying drawings. Said work shall be done in accordance with the latest edition of the National Electrical Code and all local codes and ordinances. The specifications are intended to describe a complete workable system and bidders shall report any discrepancies or omissions preventing such workability prior to the time their bids are submitted.

B. The work covered by this specification shall be as shown on the plans and called for herein, and shall be comprised generally of the following:

1. Furnish and install light fixtures, wiring, etc.
2. Furnish and install panelboards, electrical devices, wiring.
3. Furnish and install Fire Alarm System.
4. Furnish and install low voltage and Data Cabling System.

C. All equipment installed by this contractor shall be installed in strict accordance with instructions of the manufacturer.

D. He shall install his work to meet existing conditions as found at the building site.

E. The Electrical contractor is referred to the Architectural and Structural details for information in regard to the Architectural details. His work shall be done in strict accordance with local and state ordinances governing this class of work.

## 1.3 REJECTED WORK AND MATERIALS

A. Should contractor introduce any materials different from those called for and described in specifications or shown on plans, it must on notification from the engineers, be immediately removed from building or premises.

## 1.4 SHOP DRAWINGS

A. Before proceeding with work and/or within fifteen (15) days award of the General Contract for this work, the Electrical Contractor shall furnish to the Architect/Engineer, complete shop and working drawings of such apparatus, equipment, controls, insulation, etc. to be provided in this project. These drawings shall give dimensions, weights, mounting data, performance curves, and other pertinent information. Shop drawings to be submitted as listed below.

1. Lighting Fixtures.
2. Panelboards, disconnects.
3. Data Cabling.
4. Fire Alarm
5. Conduits/Cabling.
6. Wiring Devices and Switches.

B. The contractor may be required to submit shop drawings on any other material he supplies in construction of this project. These drawings shall be submitted at time requested by Architect/Engineer.

#### 1.5 ADDITIONS AND CHANGES

A. The accompanying drawings show approximate location of feeders, branch circuits, light and power circuits, etc. Complete and accurate details in regard to location of outlets, apparatus, etc. from location shown shall be made before roughing-in and without additional cost to the owner.

#### 1.6 STANDARDS OF MATERIALS AND WORKMANSHIP

A. All materials shall be new and listed by UL as conforming to its standards. Work shall be executed in a workmanlike manner and present a neat, finished appearance when completed.

#### 1.7 GUARANTEE

A. The Contractor for this work shall be required to keep the work installed by him in repair and perfect working order for one year from date of completion and final acceptance; said guarantee shall be based on defective materials and substandard workmanship. Contractor shall furnish, free of cost to owner, all materials and labor necessary to comply with this guarantee.

#### 1.8 LAWS, PERMITS AND INSPECTIONS

A. This contractor shall at his own cost obtain all necessary permits, pay all legal fees and charges, and comply with all building and safety laws, ordinances and regulations relating to the building and the public health and safety, including NEC, NFPA, IBC and OSHA.

#### 1.9 TESTS

A. After installation is complete and at such time as the Engineers may direct, Contractor shall conduct an operating test for approval. Equipment shall be demonstrated to operate in accordance with requirements of this specification. The test shall be performed in the presence of Engineers. Contractor shall furnish all instruments and personnel required for the test.

#### 1.10 CUTTING AND PATCHING

A. Contractor shall do all cutting and patching where necessary at his own expense with approval of the Engineers as to cutting of any structural beams or joists, but all patching shall be done by crafts whose work is involved. After initial surfacing has been done, all further cutting, patching, and painting shall be done at this contractor's expense.

#### 1.11 SAFETY PRECAUTIONS

A. Contractor shall furnish and place proper guards for prevention of accidents. He shall provide and maintain any other necessary construction required to secure safety of life or property, including maintenance of sufficient lights during all night hours to secure such protection.

#### 1.12 SUPERVISION

A. Contractor shall personally, or through an authorized and competent representative, constantly supervise the work done from beginning to completion and final acceptance. To the best of his ability he shall keep the same foreman and workmen throughout the project duration. During the progress of the work, it shall be subject to inspection by the representatives of the Engineers, and at these times, the contractor shall furnish the required information.

#### 1.13 INSERTS AND OPENINGS

A. Contractor shall furnish and install all inserts and hangers required to support conduit, cables, wireways, disconnect switches, etc.

#### 1.14 OPENINGS THROUGH WALLS AND FLOORS

A. Provide all slots, sleeved holes and other openings necessary through walls and floors, and through any other parts of

the structure. Where conduits pass through walls which are intended as rated fire walls, leave-outs, penetrations or sleeves shall be sealed so as not to interfere with the rating of the wall.

#### 1.15 BACKFILLING

A. Contractor shall be responsible to backfill any trenches for electrical runs under the building, paving, or any area of the site by backfilling the bottom of the trench-up to the top of the conduit with sand, then placing compacted fill in 4" layers using power tamping equipment.

#### 1.16 RECORD DRAWINGS

A. The Contractor shall be provided with a set of prints of the original bidding documents by the Architect. The Contractor shall then have a set of sepia (reproducible plans) made.

B. If the Contractor elects to vary from the contract documents and secures prior approval from the architect for any phase of the work, he shall record in a neat and readable manner, ALL such variances on the print in red. These changes shall then be transferred to the permanent set (sepia) at the completion of the job. Both the sepia and the original print shall be returned to the Engineer for documentation.

C. All deviations from sizes, locations and from all other features of the installations shown in the Contract Documents shall be recorded.

D. In addition, it shall be possible using these drawings to correctly and easily locate, identify and establish sizes of all piping, directions, and the like, as well as other features of work which will be concealed underground and/or in the finished building. Locations of underground work shall be established by dimensions to columns, lines or walls, locating all turns, etc. and by properly referenced centerline.

E. For work concealed in the building, sufficient information shall be given so it can be located with reasonable accuracy and ease. In some cases this may be by dimension. In others, it may be sufficient to illustrate the work on the drawings in relation to the spaces in the building near which it was actually installed. Architect's/Engineer's decision in this matter will be final.

F. The following requirements apply to all "record" drawings:

1. They shall be maintained at the contractor's expense.
2. All such drawings shall be done carefully and neatly and in a form approved by the Engineer.
3. Additional drawings shall be provided as necessary for clarification.
4. They shall be kept up-to-date during the entire course of the work and shall be available upon request for examination by Engineer and when necessary, to establish clearances for other parts of the work.
5. "Record" drawings shall be returned to the Architect upon completion of the work and are subject to approval of the Engineer.
6. The Contractor shall refer to the Architectural section under "RECORD DRAWINGS" for further requirements and procedures.

### END OF SECTION 16010

## SECTION 16050 - BASIC ELECTRICAL MATERIALS AND METHODS

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

#### 1.2 SUMMARY

A. This Section includes the following:

1. Supporting devices for electrical components.
2. Concrete equipment bases.
3. Cutting and patching for electrical construction.
4. Touchup painting.

#### 1.3 SUBMITTALS

A. Shop Drawings: Dimensioned plans and sections or elevation layouts of electricity-metering equipment.

B. Field Test Reports: Indicate and interpret test results for compliance with performance requirements.

#### 1.4 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

B. Comply with NFPA 70.

#### 1.5 COORDINATION

A. Coordinate chases, slots, inserts, sleeves, and openings with general construction work and arrange in building structure during progress of construction to facilitate the electrical installations that follow.

1. Set inserts and sleeves in poured-in-place concrete, masonry work, and other structural components as they are constructed.

B. Sequence, coordinate, and integrate installing electrical materials and equipment for efficient flow of the Work. Coordinate installing large equipment requiring positioning before closing in the building.

C. Coordinate electrical service connections to components furnished.

1. Coordinate installation and connection of exterior underground utilities and services, including provision for electricity-metering components.

2. Comply with requirements of authorities having jurisdiction.

D. Coordinate location of access panels and doors for electrical items that are concealed by finished surfaces. Access doors and panels are specified in Specification Section "Access Doors."

E. Where electrical identification devices are applied to field-finished surfaces, coordinate installation of identification devices with completion of finished surface.

F. Where electrical identification markings and devices will be concealed by acoustical ceilings and similar finishes, coordinate installation of these items before ceiling installation.

## PART 2 - PRODUCTS

### 2.1 SUPPORTING DEVICES

A. Material: Cold-formed steel, with corrosion-resistant coating acceptable to authorities having jurisdiction.

B. Metal Items for Use Outdoors or in Damp Locations: Hot-dip galvanized steel.

C. Slotted-Steel Channel Supports: Flange edges turned toward web, and 9/16-inch- diameter slotted holes at a maximum of 2 inches o.c., in webs.

D. Slotted-Steel Channel Supports: Comply with Specification Section "Metal Fabrications" for slotted channel framing.

1. Channel Thickness: Selected to suit structural loading.

2. Fittings and Accessories: Products of the same manufacturer as channel supports.

E. Raceway and Cable Supports: Manufactured clevis hangers, riser clamps, straps, threaded C-clamps with retainers, ceiling trapeze hangers, wall brackets, and spring-steel clamps or click-type hangers.

F. Pipe Sleeves: Schedule 40, galvanized steel, plain ends.

G. Cable Supports for Vertical Conduit: Factory-fabricated assembly consisting of threaded body and insulating wedging plug for nonarmored electrical cables in riser conduits. Plugs have number and size of conductor gripping holes as required to suit individual risers. Body constructed of malleable-iron casting with hot-dip galvanized finish.

H. Expansion Anchors: Carbon-steel wedge or sleeve type.

I. Toggle Bolts: All-steel springhead type.

J. Powder-Driven Threaded Studs: Heat-treated steel.

### 2.2 TOUCHUP PAINT

A. For Equipment: Equipment manufacturer's paint selected to match installed equipment finish.

B. Galvanized Surfaces: Zinc-rich paint recommended by item manufacturer.

### PART 3 - EXECUTION

#### 3.1 ELECTRICAL EQUIPMENT INSTALLATION

A. Temperature ratings of all equipment lugs and terminations shall be compatible with those of the wire or cable per NEC 110-14(C) and 110-40 as applicable.

B. Headroom Maintenance: If mounting heights or other location criteria are not indicated, arrange and install components and equipment to provide the maximum possible headroom.

C. Materials and Components: Install level, plumb, and parallel and perpendicular to other building systems and components, unless otherwise indicated.

D. Equipment: Install to facilitate service, maintenance, and repair or replacement of components. Connect for ease of disconnecting, with minimum interference with other installations.

E. Right of Way: Give to raceways and piping systems installed at a required slope.

#### 3.2 ELECTRICAL SUPPORTING DEVICE APPLICATION

A. Damp Locations and Outdoors: Hot-dip galvanized materials or nonmetallic, U-channel system components.

B. Dry Locations: Steel materials.

C. Support Clamps for PVC Raceways: Click-type clamp system.

D. Selection of Supports: Comply with manufacturer's written instructions.

E. Strength of Supports: Adequate to carry present and future loads, times a safety factor of at least four; minimum of 200-lb design load.

#### 3.3 SUPPORT INSTALLATION

A. Install support devices to securely and permanently fasten and support electrical components.

B. Install individual and multiple raceway hangers and riser clamps to support raceways. Provide U-bolts, clamps, attachments, and other hardware necessary for hanger assemblies and for securing hanger rods and conduits.

C. Support parallel runs of horizontal raceways together on trapeze- or bracket-type hangers.

D. Size supports for multiple raceway installations so capacity can be increased by a 25 percent minimum in the future.

E. Support individual horizontal raceways with separate, malleable-iron pipe hangers or clamps.

F. Install 1/4-inch- diameter or larger threaded steel hanger rods, unless otherwise indicated.

G. Spring-steel fasteners specifically designed for supporting single conduits or tubing may be used instead of malleable-iron hangers for 1-1/2-inch and smaller raceways serving lighting and receptacle branch circuits above suspended ceilings and for fastening raceways to slotted channel and angle supports.

H. Arrange supports in vertical runs so the weight of raceways and enclosed conductors is carried entirely by raceway supports, with no weight load on raceway terminals.

I. Simultaneously install vertical conductor supports with conductors.

J. Separately support cast boxes that are threaded to raceways and used for fixture support. Support sheet-metal boxes directly from the building structure or by bar hangers. If bar hangers are used, attach bar to raceways on opposite sides of the box and support the raceway with an approved fastener not more than 24 inches from the box.

K. Install metal channel racks for mounting cabinets, panelboards, disconnect switches, control enclosures, pull and junction boxes, transformers, and other devices unless components are mounted directly to structural elements of adequate strength.

L. Install sleeves for cable and raceway penetrations of concrete slabs and walls unless core-drilled holes are used. Install sleeves for cable and raceway penetrations of masonry and fire-rated gypsum walls and of all other fire-rated floor and wall assemblies. Install sleeves during erection of concrete and masonry walls.

M. Securely fasten electrical items and their supports to the building structure, unless otherwise indicated. Perform fastening according to the following unless other fastening methods are indicated:

1. Wood: Fasten with wood screws or screw-type nails.

2. Masonry: Toggle bolts on hollow masonry units and expansion bolts on solid masonry units.

3. New Concrete: Concrete inserts with machine screws and bolts.

4. Existing Concrete: Expansion bolts.

5. Instead of expansion bolts, threaded studs driven by a powder charge and provided with lock washers may be used in

existing concrete.

6. Steel: Welded threaded studs or spring-tension clamps on steel.

7. Welding to steel structure may be used only for threaded studs, not for conduits, pipe straps, or other items.

8. Light Steel: Sheet-metal screws.

9. Fasteners: Select so the load applied to each fastener does not exceed 25 percent of its proof-test load.

### 3.4 FIRESTOPPING

A. Apply firestopping to cable and raceway penetrations of fire-rated floor and wall assemblies to achieve fire-resistance rating of the assembly.

### 3.5 CUTTING AND PATCHING

A. Cut, channel, chase, and drill floors, walls, partitions, ceilings, and other surfaces required to permit electrical installations. Perform cutting by skilled mechanics of trades involved.

B. Repair and refinish disturbed finish materials and other surfaces to match adjacent undisturbed surfaces. Install new fireproofing where existing firestopping has been disturbed. Repair and refinish materials and other surfaces by skilled mechanics of trades involved.

### 3.6 FIELD QUALITY CONTROL

A. Inspect installed components for damage and faulty work, including the following:

1. Raceways.
2. Building wire and connectors.
3. Supporting devices for electrical components.
4. Electrical identification.
5. Electricity-metering components.
6. Concrete bases.
7. Cutting and patching for electrical construction.
8. Touchup painting.

B. Test Owner's electricity-metering installation for proper operation, accuracy, and usability of output data.

1. Connect a load of known kW rating, 1.5 kW minimum, to a circuit supplied by the metered feeder.
2. Turn off circuits supplied by the metered feeder and secure them in the "off" condition.
3. Run the test load continuously for eight hours, minimum, or longer to obtain a measurable meter indication. Use a test load placement and setting that ensure continuous, safe operation.
4. Check and record meter reading at end of test period and compare with actual electricity used based on test load rating, duration of test, and sample measurements of supply voltage at the test load connection. Record test results.
5. Repair or replace malfunctioning metering equipment or correct test setup; then retest. Repeat for each meter in installation until proper operation of entire system is verified.

### 3.7 REFINISHING AND TOUCHUP PAINTING

A. Refinish and touch up paint. Paint materials and application requirements are specified in Specification Section "Painting."

1. Clean damaged and disturbed areas and apply primer, intermediate, and finish coats to suit the degree of damage at each location.
2. Follow paint manufacturer's written instructions for surface preparation and for timing and application of successive coats.
3. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.
4. Repair damage to PVC or paint finishes with matching touchup coating recommended by manufacturer.

### 3.8 CLEANING AND PROTECTION

A. On completion of installation, including outlets, fittings, and devices, inspect exposed finish. Remove burrs, dirt, paint spots, and construction debris.

B. Protect equipment and installations and maintain conditions to ensure that coatings, finishes, and cabinets are without damage or deterioration at time of Substantial Completion.

**END OF SECTION 16050**



**SECTION 16060 - GROUNDING AND BONDING****PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

**1.2 SUMMARY**

A. This Section includes grounding of electrical systems and equipment. Grounding requirements specified in this Section may be supplemented by special requirements of systems described in other Sections.

**1.3 SUBMITTALS**

A. Product Data: For each type of product indicated.

B. Product Data: For the following:

1. Ground rods.

C. Qualification Data: For firms and persons specified in "Quality Assurance" Article.

**1.4 QUALITY ASSURANCE**

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

**PART 2 - PRODUCTS****2.1 GROUNDING CONDUCTORS**

A. For insulated conductors, comply with Division 16 Section "Conductors and Cables."

B. Material: Copper.

C. Equipment Grounding Conductors: Insulated with green-colored insulation.

D. Isolated Ground Conductors: Insulated with green-colored insulation with yellow stripe. On feeders with isolated ground, use colored tape, alternating bands of green and yellow tape to provide a minimum of three bands of green and two bands of yellow.

E. Grounding Electrode Conductors: Stranded cable.

F. Underground Conductors: Bare (uninsulated), tinned, stranded, unless otherwise indicated.

G. Copper Bonding Conductors: As follows:

1. Bonding Cable: 28 kcmil, 14 strands of No. 17 AWG copper conductor, 1/4 inch in diameter.

2. Bonding Conductor: No. 4 or No. 6 AWG, stranded copper conductor.

3. Bonding Jumper: Bare (uninsulated) copper tape, braided bare (uninsulated) copper conductors, terminated with copper ferrules; 1-5/8 inches wide and 1/16 inch thick.

4. Tinned Bonding Jumper: Tinned-copper tape, braided copper conductors, terminated with copper ferrules; 1-5/8 inches wide and 1/16 inch thick.

H. Grounding Bus: Bare (uninsulated), annealed copper bars of rectangular cross section, with insulators.

**2.2 CONNECTOR PRODUCTS**

A. Listed for use for specific types, sizes, and combinations of conductors and connected items.

B. Bolted Connectors: Bolted-pressure-type connectors, or compression type.

C. Welded Connectors: Exothermic-welded type, in kit form, and selected per manufacturer's written instructions.

**2.3 GROUNDING ELECTRODES**

A. Ground Rods: Sectional type; copper-clad steel.

1. Size: 3/4 by 120 inches in diameter.

**PART 3 - EXECUTION****3.1 APPLICATION**

A. Use only copper conductors for both insulated and bare (uninsulated) grounding conductors in direct contact with earth, crushed stone, and similar materials.

B. In raceways, use insulated equipment grounding conductors.

C. Exothermic-Welded Connections: Use for connections to structural steel and for underground connections, except those at test wells.

D. Equipment Grounding Conductor Terminations: Use bolted pressure clamps.

E. Ground Rod Clamps at Test Wells: Use bolted pressure clamps with at least two bolts.

### 3.2 EQUIPMENT GROUNDING CONDUCTORS

A. Comply with NFPA 70, Article 250, for types, sizes, and quantities of equipment grounding conductors, unless specific types, larger sizes, or more conductors than required by NFPA 70 are indicated.

B. Install equipment grounding conductors in all feeders and circuits.

C. Install insulated equipment grounding conductor with circuit conductors for the following items, in addition to those required by NEC:

1. Feeders and branch circuits.
2. Lighting circuits.
3. Receptacle circuits.
4. Flexible raceway runs.

### 3.3 INSTALLATION

A. Drive ground rods until tops are 2 inches below finished floor or final grade, unless otherwise indicated.

1. Interconnect ground rods with grounding electrode conductors. Use exothermic welds, except at test wells and as otherwise indicated. Make connections without exposing steel or damaging copper coating.

B. Grounding Conductors: Route along shortest and straightest paths possible, unless otherwise indicated. Avoid obstructing access or placing conductors where they may be subjected to strain, impact, or damage.

C. Bonding Straps and Jumpers: Install so vibration by equipment mounted on vibration isolation hangers and supports is not transmitted to rigidly mounted equipment. Use exothermic-welded connectors for outdoor locations, unless a disconnect-type connection is required; then, use a bolted clamp. Bond straps directly to the basic structure taking care not to penetrate any adjacent parts. Install straps only in locations accessible for maintenance.

D. Metal Water Service Pipe: Provide insulated copper grounding conductors, in conduit, from building's main service equipment, or grounding bus, to main metal water service entrances to building. Connect grounding conductors to main metal water service pipes by grounding clamp connectors. Where a dielectric main water fitting is installed, connect grounding conductor to street side of fitting. Bond metal grounding conductor conduit or sleeve to conductor at each end.

E. Water Meter Piping: Use braided-type bonding jumpers to electrically bypass water meters. Connect to pipe with grounding clamp connectors.

F. Bond interior metal piping systems and metal air ducts to equipment grounding conductors of associated pumps, fans, blowers, electric heaters, and air cleaners. Use braided-type bonding straps.

G. Install one test well for each service at the ground rod electrically closest to the service entrance. Set top of well flush with finished grade or floor.

### 3.4 CONNECTIONS

A. General: Make connections so galvanic action or electrolysis possibility is minimized. Select connectors, connection hardware, conductors, and connection methods so metals in direct contact will be galvanically compatible.

1. Use electroplated or hot-tin-coated materials to ensure high conductivity and to make contact points closer to order of galvanic series.
2. Make connections with clean, bare (clean) metal at points of contact.
3. Make aluminum-to-steel connections with stainless-steel separators and mechanical clamps.
4. Make aluminum-to-galvanized steel connections with tin-plated copper jumpers and mechanical clamps.
5. Coat and seal connections having dissimilar metals with inert material to prevent future penetration of moisture to contact surfaces.

B. Exothermic-Welded Connections: Comply with manufacturer's written instructions. Welds that are puffed up or that show convex surfaces indicating improper cleaning are not acceptable.

C. Equipment Grounding Conductor Terminations: For No. 8 AWG and larger, use pressure-type grounding lugs. No. 10 AWG and smaller grounding conductors may be terminated with winged pressure-type connectors.

D. Noncontact Metal Raceway Terminations: If metallic raceways terminate at metal housings without mechanical and electrical connection to housing, terminate each conduit with a grounding bushing. Connect grounding bushings with a bare (uninsulated) grounding conductor to grounding bus or terminal in housing. Bond electrically noncontinuous conduits at entrances and exits with grounding bushings and bare (uninsulated) grounding conductors, unless otherwise

indicated.

E. Connections at Test Wells: Use compression-type connectors on conductors and make bolted- and clamped-type connections between conductors and ground rods.

F. Tighten screws and bolts for grounding and bonding connectors and terminals according to manufacturer's published torque-tightening values.

G. Compression-Type Connections: Use hydraulic compression tools to provide correct circumferential pressure for compression connectors. Use tools and dies recommended by connector manufacturer. Provide embossing die code or other standard method to make a visible indication that a connector has been adequately compressed on grounding conductor.

H. Moisture Protection: If insulated grounding conductors are connected to ground rods or grounding buses, insulate entire area of connection and seal against moisture penetration of insulation and cable.

### 3.5 FIELD QUALITY CONTROL

A. Testing: Perform the following field quality-control testing:

1. After installing grounding system but before permanent electrical circuitry has been energized, test for compliance with requirements.

2. Test completed grounding system at each location where a maximum ground-resistance level is specified, at service disconnect enclosure grounding terminal, and at ground test wells. Measure ground resistance not less than two full days after the last trace of precipitation, and without the soil being moistened by any means other than natural drainage or seepage and without chemical treatment or other artificial means of reducing natural ground resistance. Perform tests, by the fall-of-potential method according to IEEE 81.

3. Provide drawings locating each ground rod and ground rod assembly and other grounding electrodes, identify each by letter in alphabetical order, and key to the record of tests and observations. Include the number of rods driven and their depth at each location and include observations of weather and other phenomena that may affect test results. Describe measures taken to improve test results.

a. Equipment Rated 500 kVA and Less: 10 ohms.

b. Equipment Rated 500 to 1000 kVA: 5 ohms.

c. Equipment Rated More Than 1000 kVA: 3 ohms.

d. Substations and Pad-Mounted Switching Equipment: 5 ohms.

e. Manhole Grounds: 10 ohms.

4. Excessive Ground Resistance: If resistance to ground exceeds specified values, notify Architect promptly and include recommendations to reduce ground resistance.

### END OF SECTION 16060

## SECTION 16075 - ELECTRICAL IDENTIFICATION

### Part 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

#### 1.2 SUMMARY

A. This Section includes electrical identification materials and devices required to comply with, NFPA 70, and authorities having jurisdiction.

#### 1.3 SUBMITTALS

A. Product Data: For each electrical identification product indicated.

B. Schedule of Nomenclature: An index of electrical equipment and system components used in identification signs and labels.

#### 1.4 QUALITY ASSURANCE

A. Comply with NFPA 70.

### PART 2 - PRODUCTS

#### 2.1 RACEWAY AND CABLE LABELS

A. Comply with NFPA 70, for minimum size of letters for legend and for minimum length of color field for each raceway

and cable size.

1. Color: Black letters on orange field.
  2. Legend: Indicates voltage and service.
- B. Adhesive Labels: Preprinted, flexible, self-adhesive vinyl with legend overlaminated with a clear, weather- and chemical-resistant coating.
- C. Colored Adhesive Tape: Self-adhesive vinyl tape not less than 3 mils thick by 1 to 2 inches wide.
- D. Underground-Line Warning Tape: Permanent, bright-colored, continuous-printed, vinyl tape.
1. Not less than 6 inches wide by 4 mils thick.
  2. Compounded for permanent direct-burial service.
  3. Embedded continuous metallic strip or core.
  4. Printed legend indicating type of underground line.
- E. Tape Markers: Vinyl or vinyl-cloth, self-adhesive, wraparound type with preprinted numbers and letters.

## 2.2 NAMEPLATES AND SIGNS

A. Engraved Plastic Nameplates and Signs: Engraving stock, melamine plastic laminate, minimum 1/16 inch thick for signs up to 20 sq. in. and 1/8 inch thick for larger sizes.

1. Engraved legend with black letters on white face.
2. Punched or drilled for mechanical fasteners.

B. Fasteners for Nameplates and Signs: Self-tapping, stainless-steel screws or No. 10/32, stainless-steel machine screws with nuts and flat and lock washers.

## 2.3 MISCELLANEOUS IDENTIFICATION PRODUCTS

A. Cable Ties: Fungus-inert, self-extinguishing, one-piece, self-locking, Type 6/6 nylon cable ties.

1. Minimum Width: 3/16 inch.
2. Tensile Strength: 50 lb minimum.
3. Temperature Range: Minus 40 to plus 185 deg F.
4. Color: According to color-coding.

B. Paint: Formulated for the type of surface and intended use.

1. Primer for Galvanized Metal: Single-component acrylic vehicle formulated for galvanized surfaces.
2. Primer for Concrete Masonry Units: Heavy-duty-resin block filler.
3. Primer for Concrete: Clear, alkali-resistant, binder-type sealer.
4. Enamel: Silicone-alkyd or alkyd urethane as recommended by primer manufacturer.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

A. Identification Materials and Devices: Install at locations for most convenient viewing without interference with operation and maintenance of equipment.

B. Lettering, Colors, and Graphics: Coordinate names, abbreviations, colors, and other designations with corresponding designations in the Contract Documents or with those required by codes and standards. Use consistent designations throughout Project.

C. Sequence of Work: If identification is applied to surfaces that require finish, install identification after completing finish work.

D. Self-Adhesive Identification Products: Clean surfaces before applying.

E. Install painted identification according to manufacturer's written instructions and as follows:

1. Clean surfaces of dust, loose material, and oily films before painting.
2. Prime surfaces using type of primer specified for surface.
3. Apply one intermediate and one finish coat of enamel.

F. Color Banding Raceways and Exposed Cables: Band exposed and accessible raceways of the systems listed below:

1. Bands: Pretensioned, wraparound plastic sleeves; colored adhesive tape; or a combination of both. Make each color band 2 inches wide, completely encircling conduit, and place adjacent bands of two-color markings in contact, side by side.
2. Band Locations: At changes in direction, at penetrations of walls and floors, at 50-foot maximum intervals in straight runs, and at 25-foot maximum intervals in congested areas.

3. Apply the following colors to the systems listed below:

a. Fire Alarm System: Red.

b. Security System: See Plans.

c. Telecommunication System: See Plans.

G. Caution Labels for Indoor Boxes and Enclosures for Power and Lighting: Install pressure-sensitive, self-adhesive labels identifying system voltage with black letters on orange background. Install on exterior of door or cover.

H. Circuit Identification Labels on Boxes: Install labels externally.

1. Exposed Boxes: Pressure-sensitive, self-adhesive plastic label on cover.

2. Concealed Boxes: Plasticized card-stock tags.

3. Labeling Legend: Permanent, waterproof listing of panel and circuit number or equivalent.

I. Paths of Underground Electrical Lines: During trench backfilling, for exterior underground power, control, signal, and communication lines, install continuous underground plastic line marker located directly above line at 6 to 8 inches below finished grade. Where width of multiple lines installed in a common trench or concrete envelope does not exceed 16 inches overall, use a single line marker. Install line marker for underground wiring, both direct-buried cables and cables in raceway.

J. Color-Coding of Secondary Phase Conductors: Use the following colors for service, feeder, and branch-circuit phase conductors:

1. 208/120-V Conductors:

a. Phase A: Black.

b. Phase B: Red.

c. Phase C: Blue

d. Neutral White

2. Factory apply color the entire length of conductors, except the following field-applied, color-coding methods may be used instead of factory-coded wire for sizes larger than No. 10 AWG:

a. Colored, pressure-sensitive plastic tape in half-lapped turns for a distance of 6 inches from terminal points and in boxes where splices or taps are made. Apply last two turns of tape with no tension to prevent possible unwinding. Use 1-inch-wide tape in colors specified. Adjust tape bands to avoid obscuring cable identification markings.

K. Power-Circuit Identification: Metal tags or aluminum, wraparound marker bands for cables, feeders, and power circuits in vaults, pull and junction boxes, manholes, and switchboard rooms.

1. Legend: 1/4-inch- steel letter and number stamping or embossing with legend corresponding to indicated circuit designations.

2. Tag Fasteners: Nylon cable ties.

3. Band Fasteners: Integral ears.

L. Apply identification to conductors as follows:

1. Conductors to Be Extended in the Future: Indicate source and circuit numbers.

2. Multiple Power or Lighting Circuits in the Same Enclosure: Identify each conductor with source, voltage, circuit number, and phase. Use color-coding to identify circuits' voltage and phase.

3. Multiple Control and Communication Circuits in the Same Enclosure: Identify each conductor by its system and circuit designation. Use a consistent system of tags, color-coding, or cable marking tape.

M. Apply warning, caution, and instruction signs as follows:

1. Warnings, Cautions, and Instructions: Install to ensure safe operation and maintenance of electrical systems and of items to which they connect. Install engraved plastic-laminated instruction signs with approved legend where instructions are needed for system or equipment operation. Install metal-backed butyrate signs for outdoor items.

2. Emergency Operation: Install engraved laminated signs with white legend on red background with minimum 3/8-inch-high lettering for emergency instructions on power transfer, load shedding, and other emergency operations.

N. Equipment Identification Labels: Engraved plastic laminate. Install on each unit of equipment, including central or master unit of each system. This includes power, lighting, communication, signal, and alarm systems, unless units are specified with their own self-explanatory identification. Unless otherwise indicated, provide a single line of text with 1/2-inch- high lettering on 1-1/2-inch- high label; where two lines of text are required, use labels 2 inches high. Use white lettering on black field. Apply labels for each unit of the following categories of equipment using mechanical fasteners:

1. Panelboards, electrical cabinets, and enclosures.
2. Access doors and panels for concealed electrical items.
3. Disconnect switches.
4. Enclosed circuit breakers.
5. Power transfer equipment.
6. Transformers.

## END OF SECTION 16075

## SECTION 16120 - CONDUCTORS AND CABLES

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

#### 1.2 SUMMARY

A. This Section includes building wires and cables and associated connectors, splices, and terminations for wiring systems rated 600 V and less.

#### 1.3 SUBMITTALS

A. Product Data: For each type of product indicated.

#### 1.4 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

B. Comply with NFPA 70.

### PART 2 - PRODUCTS

#### 2.1 CONDUCTORS AND CABLES

A. Refer to Part 3 "Conductor and Insulation Applications" Article for insulation type, cable construction, and ratings.

B. Conductor Material: Copper complying with NEMA WC 5; solid conductor for No. 10 AWG and smaller, stranded for No. 8 AWG and larger.

C. Conductor Insulation Types: Type THW or THHN-THWN complying with NEMA WC 5.

D. Multiconductor Cable: Multi-conductor cable assemblies shall not be used on this project, unless specifically accepted by the Engineer prior to installation. When armored cable assemblies are allowed for special conditions, the cable assembly shall include an extra phase conductor for future use.

#### 2.2 CONNECTORS AND SPLICES

A. Description: Factory-fabricated connectors and splices of size, ampacity rating, material, type, and class for application and service indicated.

### PART 3 - EXECUTION

#### 3.1 CONDUCTOR AND INSULATION APPLICATIONS

A. Service Entrance: Type XHHW, single conductors in raceway.

B. Exposed Feeders: Type THHN-THWN, single conductors in raceway.

C. Feeders Concealed in Ceilings, Walls, and Partitions: Type THHN-THWN, single conductors in raceway.

D. Feeders below Slabs-on-Grade, and in Crawlspace: Type THHN-THWN, single conductors in raceway.

E. Exposed Branch Circuits, including in Crawlspace: Type THHN-THWN, single conductors in raceway.

F. Branch Circuits Concealed in Ceilings, Walls, and Partitions: Type THHN-THWN, single conductors in raceway.

G. Branch Circuits below Slabs-on-Grade: Type THHN-THWN, single conductors in raceway.

H. Cord Drops and Portable Appliance Connections: Type SO, hard service cord.

I. Fire Alarm Circuits: Power-limited, fire-protective, signaling circuit cable in raceway.

J. Class 1 Control Circuits: Type THHN-THWN, in raceway.

K. Class 2 Control Circuits: Type THHN-THWN, in raceway.

### 3.2 INSTALLATION

- A. Conceal cables in finished walls, ceilings, and floors, unless otherwise indicated.
- B. Use manufacturer-approved pulling compound or lubricant where necessary; compound used must not deteriorate conductor or insulation. Do not exceed manufacturer's recommended maximum pulling tensions and sidewall pressure values.
- C. Use pulling means, including fish tape, cable, rope, and basket-weave wire/cable grips, that will not damage cables or raceway.
- D. Support cables according to Division 16 Section "Basic Electrical Materials and Methods."
- E. Seal around cables penetrating fire-rated elements according to Specification Section "Through-Penetration Firestop Systems."
- F. Identify and color-code conductors and cables according to Division 16 Section "Electrical Identification."

### 3.3 CONNECTIONS

- A. Tighten electrical connectors and terminals according to manufacturers published torque-tightening values.
- B. Make splices and taps that are compatible with conductor material and that possess equivalent or better mechanical strength and insulation ratings than unspliced conductors.
- C. Wiring at Outlets: Install conductor at each outlet, with at least 2 inches of slack.

### 3.4 FIELD QUALITY CONTROL

- A. Testing: Perform the following field quality-control testing:
  - 1. After installing conductors and cables and before electrical circuitry has been energized, test for compliance with requirements.

### END OF SECTION 16120

## SECTION 16130 - RACEWAYS AND BOXES

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

#### 1.2 SUMMARY

- A. This Section includes raceways, fittings, boxes, enclosures, and cabinets for electrical wiring.
- B. Related Sections include the following:
  - 1. Specification Section "Through-Penetration Firestop Systems" for firestopping materials and installation at penetrations through walls, ceilings, and other fire-rated elements.
  - 2. Division 16 Section "Basic Electrical Materials and Methods" for supports, anchors, and identification products.
  - 3. Division 16 Section "Wiring Devices" for devices installed in boxes and for floor-box service fittings.

#### 1.3 DEFINITIONS

- A. EMT: Electrical metallic tubing.
- B. ENT: Electrical nonmetallic tubing.
- C. FMC: Flexible metal conduit.
- D. IMC: Intermediate metal conduit.
- E. LFMC: Liquidtight flexible metal conduit.
- F. LFNC: Liquidtight flexible nonmetallic conduit.
- G. RNC: Rigid nonmetallic conduit.

#### 1.4 SUBMITTALS

- A. Product Data: For surface raceways, wireways and fittings, floor boxes, hinged-cover enclosures, and cabinets.

#### 1.5 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- B. Comply with NFPA 70.

#### 1.6 COORDINATION

A. Coordinate layout and installation of raceways, boxes, enclosures, cabinets, and suspension system with other construction that penetrates ceilings or is supported by them, including light fixtures, HVAC equipment, fire-suppression system, and partition assemblies.

## PART 2 - PRODUCTS

### 2.1 METAL CONDUIT AND TUBING

A. Rigid Steel Conduit:

B. Aluminum Rigid Conduit:

C. IMC:

D. Plastic-Coated Steel Conduit and Fittings:

E. Plastic-Coated IMC and Fittings:

F. EMT and Fittings:

1. Fittings: compression type.

G. FMC: Zinc-coated steel.

H. LFMC: Flexible steel conduit with PVC jacket.

I. Fittings: compatible with conduit and tubing materials.

### 2.2 NONMETALLIC CONDUIT AND TUBING

A. RNC: Schedule 40 and Schedule 80 PVC.

### 2.3 METAL WIREWAYS

A. Material and Construction: Sheet metal sized and shaped as indicated, NEMA 1 or 3R as required.

B. Fittings and Accessories: Include couplings, offsets, elbows, expansion joints, adapters, hold-down straps, end caps, and other fittings to match and mate with wireways as required for complete system.

C. Select features, unless otherwise indicated, as required to complete wiring system and to comply with NFPA 70.

D. Wireway Covers: Hinged type.

E. Finish: Manufacturer's standard enamel finish.

### 2.4 SURFACE RACEWAYS

A. Surface Metal Raceways: Galvanized steel with snap-on covers. Finish with manufacturer's standard prime coating.

B. Types, sizes, and channels as indicated and required for each application, with fittings that match and mate with raceways.

### 2.5 BOXES, ENCLOSURES, AND CABINETS

A. Sheet Metal Outlet and Device Boxes:

B. Cast-Metal Outlet and Device Boxes: Type FD, with gasketed cover.

C. Floor Boxes: Cast metal, fully adjustable, rectangular.

D. Small Sheet Metal Pull and Junction Boxes:

E. Cast-Metal Pull and Junction Boxes: cast aluminum with gasketed cover.

F. Hinged-Cover Enclosures: Type 1, with continuous hinge cover and flush latch.

1. Metal Enclosures: Steel, finished inside and out with manufacturer's standard enamel.

2. Nonmetallic Enclosures: Plastic, finished inside with radio-frequency-resistant paint.

G. Cabinets: Type 1, galvanized steel box with removable interior panel and removable front, finished inside and out with manufacturer's standard enamel. Hinged door in front cover with flush latch and concealed hinge. Key latch to match panelboards. Include metal barriers to separate wiring of different systems and voltage and include accessory feet where required for freestanding equipment.

### 2.6 FACTORY FINISHES

A. Finish: For raceway, enclosure, or cabinet components, provide manufacturer's standard prime-coat finish ready for field painting.

## PART 3 - EXECUTION

### 3.1 RACEWAY APPLICATION

A. Outdoors:

1. Exposed: Rigid steel or IMC.

2. Concealed: Rigid steel or IMC.

3. Underground, Single Run: RNC.



4. Underground, Grouped: RNC.
5. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): LFMC.
6. Boxes and Enclosures: Nema Type 3R.
- B. Indoors:
  1. Exposed: Rectangular Metal Raceway (Wirmold)
  2. Concealed: EMT.
  3. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): FMC; except use LFMC in damp or wet locations.
  4. Damp or Wet Locations: Rigid steel conduit.
  5. Boxes and Enclosures: Nema Type 1, except as follows:
    - a. Damp or Wet Locations: Nema Type 4.
  - C. Minimum Raceway Size: 1/2-inch trade size.
  - D. Raceway Fittings: Compatible with raceways and suitable for use and location.
    1. Intermediate Steel Conduit: Use threaded rigid steel conduit fittings, unless otherwise indicated.
    2. PVC Externally Coated, Rigid Steel Conduits: Use only fittings approved for use with that material. Patch all nicks and scrapes in PVC coating after installing conduits.
  - E. Install nonferrous conduit or tubing for circuits operating above 60 Hz. Where aluminum raceways are installed for such circuits and pass through concrete, install in nonmetallic sleeve.
  - F. Do not install aluminum conduits embedded in or in contact with concrete.
- 3.2 INSTALLATION
  - A. Keep raceways at least 6 inches away from parallel runs of flues and steam or hot-water pipes. Install horizontal raceway runs above water and steam piping.
  - B. Complete raceway installation before starting conductor installation.
  - C. Support raceways as specified in Division 16 Section "Basic Electrical Materials and Methods."
  - D. Install temporary closures to prevent foreign matter from entering raceways.
  - E. Protect stub-ups from damage where conduits rise through floor slabs. Arrange so curved portions of bends are not visible above the finished slab.
  - F. Make bends and offsets so ID is not reduced. Keep legs of bends in the same plane and keep straight legs of offsets parallel, unless otherwise indicated.
  - G. Conceal conduit and EMT within finished walls, ceilings, and floors, unless otherwise indicated.
    1. Install concealed raceways with a minimum of bends in the shortest practical distance, considering type of building construction and obstructions, unless otherwise indicated.
  - H. Raceways shall not be embedded in concrete slabs.
  - I. Install exposed raceways parallel or at right angles to nearby surfaces or structural members and follow surface contours as much as possible.
    1. Run parallel or banked raceways together on common supports.
    2. Make parallel bends in parallel or banked runs. Use factory elbows only where elbows can be installed parallel; otherwise, provide field bends for parallel raceways.
  - J. Join raceways with fittings designed and approved for that purpose and make joints tight.
    1. Use insulating bushings to protect conductors.
  - K. Tighten set screws of threadless fittings with suitable tools.
  - L. Terminations:
    1. Where raceways are terminated with locknuts and bushings, align raceways to enter squarely and install locknuts with dished part against box. Use two locknuts, one inside and one outside box.
    2. Where raceways are terminated with threaded hubs, screw raceways or fittings tightly into hub so end bears against wire protection shoulder. Where chase nipples are used, align raceways so coupling is square to box; tighten chase nipple so no threads are exposed.
  - M. Install pull wires in empty raceways. Use polypropylene or monofilament plastic line with not less than 200-lb tensile strength. Leave at least 12 inches of slack at each end of pull wire.

N. Telephone and Signal System Raceways, 2-Inch Trade Size and Smaller: In addition to above requirements, install raceways in maximum lengths of 150 feet and with a maximum of two 90-degree bends or equivalent. Separate lengths with pull or junction boxes where necessary to comply with these requirements.

O. Install raceway sealing fittings at suitable, approved, and accessible locations and fill them with UL-listed sealing compound. For concealed raceways, install each fitting in a flush steel box with a blank cover plate having a finish similar to that of adjacent plates or surfaces. Install raceway sealing fittings at the following points:

1. Where conduits pass from warm to cold locations, such as boundaries of refrigerated spaces.
2. Where otherwise required by NFPA 70.

P. Stub-up Connections: Extend conduits through concrete floor for connection to freestanding equipment. Install with an adjustable top or coupling threaded inside for plugs set flush with finished floor. Extend conductors to equipment with rigid steel conduit; FMC may be used 6 inches above the floor. Install screwdriver-operated, threaded plugs flush with floor for future equipment connections.

Q. Flexible Connections: Use maximum of 48 inches of flexible conduit for recessed and semirecessed lighting fixtures; for equipment subject to vibration, noise transmission, or movement; and for all motors. Use LFMC in damp or wet locations. Install separate ground conductor across flexible connections.

R. Surface Raceways: Install a separate, green, ground conductor in raceways from junction box supplying raceways to receptacle or fixture ground terminals.

S. Set floor boxes level and flush with finished floor surface.

T. Set floor boxes level. Trim after installation to fit flush with finished floor surface.

U. Install hinged-cover enclosures and cabinets plumb. Support at each corner.

### 3.3 PROTECTION

A. Provide final protection and maintain conditions that ensure coatings, finishes, and cabinets are without damage or deterioration at time of Substantial Completion.

1. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.
2. Repair damage to PVC or paint finishes with matching touchup coating recommended by manufacturer.

### 3.4 CLEANING

A. After completing installation of exposed, factory-finished raceways and boxes, inspect exposed finishes and repair damaged finishes.

## END OF SECTION 16130

## SECTION 16140 - WIRING DEVICES

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

#### 1.2 SUMMARY

A. This Section includes the following:

1. Single and duplex receptacles, ground-fault circuit interrupters, integral surge suppression units, and isolated-ground receptacles.
2. Single- and double-pole snap switches and dimmer switches.
3. Device wall plates.
4. Pin and sleeve connectors and receptacles.
5. Floor service outlets, poke-through assemblies, service poles, and multioutlet assemblies.

#### 1.3 DEFINITIONS

A. EMI: Electromagnetic interference.

- B. GFCI: Ground-fault circuit interrupter.
- C. PVC: Polyvinyl chloride.
- D. RFI: Radio-frequency interference.
- E. TVSS: Transient voltage surge suppressor.
- F. UTP: Unshielded twisted pair.

#### 1.4 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: List of legends and description of materials and process used for premarking wall plates.
- C. Samples: One for each type of device and wall plate specified, in each color specified.
- D. Field quality-control test reports.

#### 1.5 QUALITY ASSURANCE

- A. Source Limitations: Obtain each type of wiring device through one source from a single manufacturer.
- B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- C. Comply with NFPA 70.

#### 1.6 COORDINATION

- A. Receptacles for Owner-Furnished Equipment: Match plug configurations.
- 1. Cord and Plug Sets: Match equipment requirements.

### PART 2 - PRODUCTS

#### 2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

- 1. Wiring Devices:
  - a. Hubbell Incorporated; Wiring Device-Kellems.
  - b. Leviton Mfg. Company Inc.
  - c. Pass & Seymour/Legrand; Wiring Devices Div.
- 2. Wiring Devices for Hazardous (Classified) Locations:
  - a. Crouse-Hinds/Cooper Industries, Inc.; Arrow Hart Wiring Devices.
  - b. EGS/Appleton Electric Company.
  - c. Killark Electric Manufacturing Co./Hubbell Incorporated.
- 3. Multioutlet Assemblies:
  - a. Hubbell Incorporated; Wiring Device-Kellems.
  - b. Wiremold Company (The).

#### 2.2 RECEPTACLES (Leviton 5362 or approved equal)

- A. Straight-Blade-Type Receptacles: Comply with NEMA WD 1, NEMA WD 6, DSCC W-C-596G, and UL 498.
- B. Straight-Blade and Locking Receptacles: Heavy-Duty grade.
- C. GFCI Receptacles: Straight blade, non-feed-through type, Heavy-Duty grade, with integral NEMA WD 6, Configuration 5-20R duplex receptacle; complying with UL 498 and UL 943. Design units for installation in a 2-3/4-inch-deep outlet box without an adapter. (Leviton Model # GFNT2 or approved equal)
- D. Isolated-Ground Receptacle: Straight blade, Heavy-Duty grade, duplex receptacle, with equipment grounding contacts connected only to the green grounding screw terminal of the device and with inherent electrical isolation from mounting strap. (Leviton Model # 5362-IG or approved equal)
  - 1. Devices: Listed and labeled as isolated-ground receptacles.
  - 2. Isolation Method: Integral to receptacle construction and not dependent on removable parts.

- E. TVSS Receptacles: Straight blade, NEMA WD 6, Configuration 5-20R, with integral TVSS in line to ground, line to neutral, and neutral to ground.
  - 1. TVSS Components: Multiple metal-oxide varistors; with a nominal clamp level rating of 500 volts and minimum single transient pulse energy dissipation of 140 J line to neutral, and 70 J line to ground and neutral to ground.
  - 2. Active TVSS Indication: Visual only with light visible in face of device to indicate device is "active" or "no longer in service."
  - 3. Identification: Distinctive marking on face of device to denote TVSS-type unit.
- F. Industrial Heavy-Duty Pin and Sleeve Devices: Comply with IEC 309-1.
- G. Hazardous (Classified) Location Receptacles: Comply with NEMA FB 11.
- H. Weather Resistant (WP): Leviton Commercial Heavy-Duty Grade 20Amp to comply with NEC Section 406.8
- I. Tamper Resistant (TR): Leviton TBR20 or approved equal.
- J. USB: Leviton T5832-I or approved equal.

## 2.3 PENDANT CORD/CONNECTOR DEVICES

- A. Description: Matching, locking-type plug and receptacle body connector, NEMA WD 6, Configurations L5-20P and L5-20R, Heavy-Duty grade.
  - 1. Body: Nylon with screw-open cable-gripping jaws and provision for attaching external cable grip.
  - 2. External Cable Grip: Woven wire-mesh type made of high-strength galvanized-steel wire strand, matched to cable diameter, and with attachment provision designed for corresponding connector.

## 2.4 CORD AND PLUG SETS

- A. Description: Match voltage and current ratings and number of conductors to requirements of equipment being connected.
  - 1. Cord: Rubber-insulated, stranded-copper conductors, with Type SOW-A jacket; with green-insulated grounding conductor and equipment-rating ampacity plus a minimum of 30 percent.
  - 2. Plug: Nylon body and integral cable-clamping jaws. Match cord and receptacle type for connection.

## 2.5 SWITCHES (Leviton Models 1221-2,1222-2,1223-2 and 1224-2 or approved equal)

- A. Single- and Double-Pole Switches: Comply with DSCC W-C-896F and UL 20.
- B. Snap Switches: Heavy-Duty grade, quiet type.
- C. Combination Switch and Receptacle: Both devices in a single gang unit with plaster ears and removable tab connector that permit separate or common feed connection.
  - 1. Switch: 20 A, 120/277-V ac.
  - 2. Receptacle: NEMA WD 6, Configuration 5-15R.
- D. Dimmer Switches: Modular, full-wave, solid-state units with integral, quiet on/off switches and audible frequency and EMI/RFI filters.
  - 1. Control: Continuously adjustable toggle switch; with single-pole or three-way switching to suit connections.
  - 2. Incandescent Lamp Dimmers: Modular, 120 V, 60 Hz with continuously adjustable rotary knob, toggle switch, or slider; single pole with soft tap or other quiet switch; EMI/RFI filter to eliminate interference; and 5-inch wire connecting leads.
  - 3. Fluorescent Lamp Dimmer Switches: Modular; compatible with dimmer ballasts; trim potentiometer to adjust low-end dimming; dimmer-ballast combination capable of consistent dimming with low end not greater than 20 percent of full brightness.

## 2.6 WALL PLATES (Hubbell or approved equal)

- A. Single and combination types to match corresponding wiring devices.
  - 1. Plate-Securing Screws: Metal with head color to match plate finish.
  - 2. Material for Finished Spaces: Smooth, high-impact thermoplastic.
  - 3. Material for Unfinished Spaces: Galvanized steel.
  - 4. Material for Wet Locations: Cast aluminum with spring-loaded lift cover, and listed and labeled for use in "wet

locations."

## 2.7 FLOOR SERVICE FITTINGS

- A. Type: Modular, flush-type, dual-service units suitable for wiring method used.
- B. Compartments: Barrier separates power from voice and data communication cabling.
- C. Service Plate: Rectangular, with satin finish.
- D. Power Receptacle: NEMA WD 6, Configuration 5-20R, gray finish, unless otherwise indicated.
- E. Voice and Data Communication Outlet: Two modular, keyed, color-coded, RJ-45 Category 6 jacks for UTP cable.

## 2.8. MULTIOUTLET ASSEMBLIES

- A. Components of Assemblies: Products from a single manufacturer designed for use as a complete, matching assembly of raceways and receptacles.
- B. Raceway Material: Metal, with manufacturer's standard finish.
- C. Wire: No. 12 AWG.

## 2.9 FINISHES

- A. Color:

1. Wiring Devices Connected to Normal Power System: **As selected by Architect, unless otherwise indicated or required by NFPA 70.**
2. TVSS Devices: Blue.
3. Isolated-Ground Receptacles: As specified above, with orange triangle on face.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Install devices and assemblies level, plumb, and square with building lines.
- B. Install wall dimmers to achieve indicated rating after derating for ganging according to manufacturer's written instructions.
- C. Install unshared neutral conductors on line and load side of dimmers according to manufacturers' written instructions.
- D. Arrangement of Devices: Unless otherwise indicated, mount flush, with long dimension vertical, and with grounding terminal of receptacles on top. Group adjacent switches under single, multigang wall plates.
- E. Remove wall plates and protect devices and assemblies during painting.
- F. Adjust locations of floor service outlets and service poles to suit arrangement of partitions and furnishings.

### 3.2 IDENTIFICATION

- A. Comply with Division 16 Section "Electrical Identification."
- 1. Receptacles: Identify panelboard and circuit number from which served. Use hot, stamped or engraved machine printing with black-filled lettering on face of plate, and durable wire markers or tags inside outlet boxes.

### 3.3 CONNECTIONS

- A. Ground equipment according to Division 16 Section "Grounding and Bonding."
- B. Connect wiring according to Division 16 Section "Conductors and Cables."
- C. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

### 3.4 FIELD QUALITY CONTROL

- A. Perform the following field tests and inspections and prepare test reports:
  1. After installing wiring devices and after electrical circuitry has been energized, test for proper polarity, ground continuity, and compliance with requirements.
  2. Test GFCI operation with both local and remote fault simulations according to manufacturer's written instructions.

B. Remove malfunctioning units, replace with new units, and retest as specified above.

## END OF SECTION 16140

## SECTION 16145 - LIGHTING CONTROL DEVICES

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

#### 1.2 SUMMARY

A. This Section includes the following lighting control devices:

1. Time switches.
2. Outdoor and indoor photoelectric switches.
3. Switch-box occupancy sensors.
4. Indoor occupancy sensors.
5. Outdoor motion sensors.
6. Multipole contactors.

B. Related Sections include the following:

1. Division 16 Section "Wiring Devices" for wall-box dimmers and manual light switches.
2. Division 16 Section "Dimming Controls" for architectural dimming system equipment.

#### 1.3 DEFINITIONS

- A. LED: Light-emitting diode.
- B. PIR: Passive infrared.

#### 1.4 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: Show installation details for occupancy and light-level sensors.
1. Lighting plan showing location, orientation, and coverage area of each sensor.
  2. Interconnection diagrams showing field-installed wiring.
- C. Field quality-control test reports.
- D. Operation and Maintenance Data: For each type of product to include in emergency, operation, and maintenance manuals.

#### 1.5 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

#### 1.6 COORDINATION

A. Coordinate layout and installation of ceiling-mounted devices with other construction that penetrates ceilings or is supported by them, including light fixtures, HVAC equipment, fire-suppression system, and partition assemblies.

### PART 2 - PRODUCTS

#### 2.1 MANUFACTURERS

A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.

## 2.2 GENERAL LIGHTING CONTROL DEVICE REQUIREMENTS

A. Line-Voltage Surge Protection: An integral part of the devices for 120- and 277-V solid-state equipment. For devices without integral line-voltage surge protection, field-mounting surge protection shall comply with IEEE C62.41 and with UL 1449.

## 2.3 TIME SWITCHES

A. Manufacturers:

1. Area Lighting Research, Inc.
2. Fisher Pierce.
3. Grasslin Controls Corporation.
4. Intermatic, Inc.
5. Leviton Mfg. Company Inc.
6. Lightolier Controls; a Genlyte Company.
7. Lithonia Lighting.
8. Paragon Electric Co.
9. Touchplate Technologies, Inc.
10. Watt Stopper (The).

B. Digital Time Switches: Electronic, solid-state programmable units with alphanumeric display complying with UL 917.

1. Contact Configuration: As indicated.
2. Contact Rating: As indicated..
3. Program: Single channel, 2 on-off set points on a 24-hour schedule with skip-a-day weekly schedule.
4. Circuitry: Allow connection of a photoelectric relay as substitute for on and off function of a program.
5. Astronomical Time: All channels.
6. Battery Backup: For schedules and time clock.

## 2.4 OUTDOOR PHOTOELECTRIC SWITCHES

A. Manufacturers:

1. Area Lighting Research, Inc.
2. Fisher Pierce.
3. Grasslin Controls Corporation.
4. Intermatic, Inc.
5. Lithonia Lighting.
6. Novitas, Inc.
7. Paragon Electric Co.
8. Square D.
9. TORK.
10. Touchplate Technologies, Inc.
11. Watt Stopper (The).

B. Description: Solid state, with DPST dry contacts rated for 1800-VA tungsten or 1000-VA inductive, to operate connected relay, contactor coils, microprocessor input, and complying with UL 773A.

1. Light-Level Monitoring Range: 1.5 to 10 fc, with an adjustment for turn-on and turn-off levels within that range, and a directional lens in front of photocell to prevent fixed light sources from causing turn-off.
2. Time Delay: 15-second minimum, to prevent false operation.
3. Surge Protection: Metal-oxide varistor type, complying with IEEE C62.41 for Category A1 locations.
4. Mounting: Twist lock complying with IEEE C136.10, with base-and-stem mounting or stem-and-swivel mounting accessories as required to direct sensor to the North sky exposure.

## 2.5 INDOOR PHOTOELECTRIC SWITCHES

### A. Manufacturers:

1. Allen-Bradley/Rockwell Automation.
2. Area Lighting Research, Inc.
3. Cutler-Hammer; Eaton Corporation.
4. Fisher Pierce.
5. Grasslin Controls Corporation.
6. Intermatic, Inc.
7. Lithonia Lighting.
8. MicroLite Corporation.
9. Novitas, Inc.
10. Paragon Electric Co.
11. Square D.
12. TORK.
13. Touchplate Technologies, Inc.
14. Watt Stopper (The).

B. Ceiling-Mounting Photoelectric Switch: Solid-state, light-level sensor unit, with separate relay unit mounted on luminaire, to detect changes in lighting levels that are perceived by the eye. Cadmium sulfide photoresistors are not acceptable.

1. Sensor Output: Contacts rated to operate the associated relay, complying with UL 773A. Sensor shall be powered from the relay unit.
2. Relay Unit: Dry contacts rated for 20-A ballast load at 120- and 277-V ac, for 13-A tungsten at 120-V ac, and for 1 hp at 120-V ac. Power supply to sensor shall be 24-V dc, 150-mA, Class 2 power source as defined by NFPA 70.
3. Light-Level Monitoring Range: 10 to 200 fc, with an adjustment for turn-on and turn-off levels within that range.
4. Time Delay: Adjustable from 5 to 300 seconds to prevent cycling, with deadband adjustment.
5. Indicator: Two LEDs to indicate the beginning of on and off cycles.

C. Skylight Photoelectric Sensors: Solid-state, light-level sensor; housed in a threaded, plastic fitting for mounting under skylight, facing up at skylight; with separate relay unit mounted on luminaire, to detect changes in lighting levels that are perceived by the eye. Cadmium sulfide photoresistors are not acceptable.

1. Sensor Output: Contacts rated to operate the associated relay, complying with UL 773A. Sensor shall be powered from the relay unit.
2. Relay Unit: Dry contacts rated for 20-A ballast load at 120- and 277-V ac, for 13-A tungsten at 120-V ac, and for 1 hp at 120-V ac. Power supply to sensor shall be 24-V dc, 150-mA, Class 2 power source as defined by NFPA 70.
3. Light-Level Monitoring Range: 1000 to 10,000 fc, with an adjustment for turn-on and turn-off levels within that range.
4. Time Delay: Adjustable from 5 to 300 seconds to prevent cycling, with deadband adjustment.
5. Indicator: Two LEDs to indicate the beginning of on and off cycles.

## 2.6 SWITCH-BOX OCCUPANCY SENSORS

### A. Manufacturers:

1. Bryant Electric; a Hubbell Company.
2. Hubbell Lighting Inc.
3. Leviton Mfg. Company Inc.
4. Lightolier Controls; a Genlyte Company.
5. Lithonia Lighting.
6. MYTECH Corporation.
7. Novitas, Inc.
8. RAB Electric Manufacturing, Inc.
9. Sensor Switch, Inc.



10. TORK.
11. Unenco Electronics; a Hubbell Company.
12. Watt Stopper (The).

B. Description: PIR type with integral power-switching contacts rated for 800 W at 120-V ac, suitable for incandescent light fixtures, fluorescent light fixtures with magnetic or electronic ballasts, or 1/6-hp motors; and rated for 1000 W at 277-V ac, suitable for incandescent light fixtures, fluorescent light fixtures with magnetic or electronic ballasts, or 1/3-hp motors, minimum.

## 2.7 INDOOR OCCUPANCY SENSORS

### A. Manufacturers:

1. Hubbell Lighting Inc.
2. Leviton Mfg. Company Inc.
3. Lithonia Lighting.
4. MYTECH Corporation.
5. Novitas, Inc.
6. RAB Electric Manufacturing, Inc.
7. Sensor Switch, Inc.
8. TORK.
9. Unenco Electronics; a Hubbell Company.
10. Watt Stopper (The).

B. General Description: Wall- or ceiling-mounting, solid-state units with a separate relay unit.

1. Operation: Unless otherwise indicated, turn lights on when covered area is occupied and off when unoccupied; with a time delay for turning lights off, adjustable over a minimum range of 1 to 15 minutes.
2. Sensor Output: Contacts rated to operate the connected relay, complying with UL 773A. Sensor shall be powered from the relay unit.
3. Relay Unit: Dry contacts rated for 20-A ballast load at 120- and 277-V ac, for 13-A tungsten at 120-V ac, and for 1 hp at 120-V ac. Power supply to sensor shall be 24-V dc, 150-mA, Class 2 power source as defined by NFPA 70.
4. Mounting:
  - a. Sensor: Suitable for mounting in any position on a standard outlet box.
  - b. Relay: Externally mounted through a 1/2-inch knockout in a standard electrical enclosure.
  - c. Time-Delay and Sensitivity Adjustments: Recessed and concealed behind hinged door.
5. Indicator: LED, to show when motion is being detected during testing and normal operation of the sensor.
6. Bypass Switch: Override the on function in case of sensor failure.
7. Automatic Light-Level Sensor: Adjustable from 2 to 200 fc; keeps lighting off when selected lighting level is present.
8. FailSafe: In case of sensor failure, lighting fixtures shall remain on.

C. Dual-Technology Type: Ceiling mounting; detect occupancy by using a combination of PIR and ultrasonic detection methods in area of coverage. Particular technology or combination of technologies that controls on and off functions shall be selectable in the field by operating controls on unit.

1. Sensitivity Adjustment: Separate for each sensing technology.
2. Detector Sensitivity: Detect occurrences of 6-inch minimum movement of any portion of a human body that presents a target of at least 36 sq. in., and detect a person of average size and weight moving at least 12 inches in either a horizontal or a vertical manner at an approximate speed of 12 inches/s.
3. Detection Coverage (Standard Room): Detect occupancy anywhere within a circular area of 1000 sq. ft. when mounted on a 96-inch- high ceiling.

## 2.8 OUTDOOR MOTION SENSORS (PIR)

### A. Manufacturers:

1. Bryant Electric; a Hubbell Company.
2. Hubbell Lighting Inc.
3. Lithonia Lighting.
4. Paragon Electric Co.
5. RAB Electric Manufacturing, Inc.
6. TORK.
7. Watt Stopper (The).

B. General Description: Suitable for operation in ambient temperatures ranging from minus 40 deg F to 130 deg F, UL 773A rated as raintight.

1. Operation: Turn lights on when sensing infrared energy changes between background and moving body in area of coverage; with a time delay for turning lights off, adjustable over a minimum range of 1 to 15 minutes.
2. Sensor Output: Suitable for switching 300 W of tungsten load at 120- or 277-V ac. Lampholders shall comply with UL 1571 for wet locations.
3. Sensor Output: Contacts rated to operate the connected relay, complying with UL 773A. Sensor shall be powered from the relay unit.
4. Relay Unit: Dry contacts rated for 20-A ballast load at 120- and 277-V ac, for 13-A tungsten at 120-V ac, and for 1 hp at 120-V ac. Power supply to sensor shall be 24-V dc, 150-mA, Class 2 power source as defined by NFPA 70.
5. Mounting:
  - a. Sensor: Suitable for mounting in any position on a standard outdoor junction box.
  - b. Relay: Internally mounted in a standard weatherproof electrical enclosure.
  - c. Time-Delay and Sensitivity Adjustments: Recessed and concealed behind hinged door.
6. Indicator: LED, to show when motion is being detected during testing and normal operation of the sensor.
7. Bypass Switch: Override the on function in case of sensor failure.
8. Automatic Light-Level Sensor: Adjustable from 1 to 20 fc; keeps lighting off during daylight hours.

C. Detector Sensitivity: Detect occurrences of 6-inch minimum movement of any portion of a human body that presents a target of at least 36 sq. in.

## 2.9 MULTIPOLE CONTACTORS

- A. Manufacturers:
1. Allen-Bradley/Rockwell Automation.
  2. ASCO Power Technologies, LP; a division of Emerson Electric Co.
  3. Cutler-Hammer; Eaton Corporation.
  4. Fisher Pierce.
  5. GE Industrial Systems; Total Lighting Control.
  6. Grasslin Controls Corporation.
  7. Hubbell Lighting Inc.
  8. Lithonia Lighting.
  9. MicroLite Corporation.
  10. TORK.
  11. Touchplate Technologies, Inc.
  12. Watt Stopper (The).

B. Description: Electrically operated and electrically held, complying with NEMA ICS 2 and UL 508.

1. Current Rating for Switching: Listing or rating consistent with type of load served, including tungsten filament, inductive, and high-inrush ballast (ballast with 15 percent or less total harmonic distortion of normal load current).
2. Control-Coil Voltage: Match control power source.

## 2.10 CONDUCTORS AND CABLES

1. Power Wiring to Supply Side of Remote-Control Power Sources: Not smaller than No. 12 AWG, complying with Division 16 Section "Conductors and Cables."
2. Install unshielded, twisted-pair cable for control and signal transmission conductors, complying with Division 16 Section "Voice and Data Communication Cabling."

### PART 3 - EXECUTION

#### 3.1 SENSOR INSTALLATION

- A. Install and aim sensors in locations to achieve at least 90 percent coverage of areas indicated. Do not exceed coverage limits specified in manufacturer's written instructions.

#### 3.2 WIRING INSTALLATION

- A. Wiring Method: Comply with Division 16 Section "Conductors and Cables." Minimum conduit size shall be ½ inch.
- B. Wiring within Enclosures: Bundle, lace, and train conductors to terminal points. Separate power-limited and nonpower-limited conductors according to conductor manufacturer's written instructions.
- C. Install field-mounting transient voltage suppressors for lighting control devices in Category A locations that do not have integral line-voltage surge protection.
- D. Size conductors according to lighting control device manufacturer's written instructions, unless otherwise indicated.
- E. Splices, Taps, and Terminations: Make connections only on numbered terminal strips in junction, pull, and outlet boxes; terminal cabinets; and equipment enclosures.
- F. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

#### 3.3 IDENTIFICATION

- A. Identify components and power and control wiring according to Division 16 Section "Electrical Identification."
- B. Label time switches and contactors with a unique designation.

#### 3.4 FIELD QUALITY CONTROL

- A. Perform the following field tests and inspections and prepare test reports:
  1. After installing time switches and sensors, and after electrical circuitry has been energized, adjust and test for compliance with requirements.
  2. Operational Test: Verify actuation of each sensor and adjust time delays.
- B. Remove and replace lighting control devices where test results indicate that they do not comply with specified requirements.
- C. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

#### 3.5 ADJUSTING

- A. Occupancy Adjustments: When requested within 12 months of date of Substantial Completion, provide on-site assistance in adjusting sensors to suit actual occupied conditions. Provide up to two visits to site outside normal occupancy hours for this purpose.

### END OF SECTION 16145

## SECTION 16410 - ENCLOSED SWITCHES AND CIRCUIT BREAKERS

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

#### 1.2 SUMMARY

A. This Section includes the following individually mounted, enclosed switches and circuit breakers:

1. Fusible switches.
2. Nonfusible switches.
3. Molded-case circuit switches.
4. Molded-case switches.
5. Enclosures.

### 1.3 DEFINITIONS

- A. GD: General duty.  
B. GFCI: Ground-fault circuit interrupter.  
C. HD: Heavy duty.  
D. RMS: Root mean square. E. SPDT: Single pole, double throw.

### 1.4 SUBMITTALS

A. Product Data: For each type of enclosed switch, circuit breaker, accessory, and component indicated. Include dimensioned elevations, sections, weights, and manufacturers' technical data on features, performance, electrical characteristics, ratings, and finishes.

1. Enclosure types and details for types other than NEMA 250, Type 1.
2. Current and voltage ratings.
3. Short-circuit current rating.
4. Features, characteristics, ratings, and factory settings of individual overcurrent protective devices and auxiliary components.

B. Shop Drawings: Diagram power, signal, and control wiring.

C. Operation and Maintenance Data: For enclosed switches and circuit breakers to include in emergency, operation, and maintenance manuals. In addition to items specified in Division 1 Section include the following:

1. Manufacturer's written instructions for testing and adjusting enclosed switches and circuit breakers.
2. Time-current curves, including selectable ranges for each type of circuit breaker.

### 1.5 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

B. Comply with NFPA 70.

C. Product Selection for Restricted Space: Drawings indicate maximum dimensions for enclosed switches and circuit breakers, including clearances between enclosures, and adjacent surfaces and other items. Comply with indicated maximum dimensions.

### 1.6 PROJECT CONDITIONS

A. Environmental Limitations: Rate equipment for continuous operation under the following conditions, unless otherwise indicated:

1. Ambient Temperature: Not less than minus 22 deg F and not exceeding 104 deg F.
2. Altitude: Not exceeding 6600 feet.

### 1.7 COORDINATION

A. Coordinate layout and installation of switches, circuit breakers, and components with other construction, including conduit, piping, equipment, and adjacent surfaces. Maintain required workspace clearances and required clearances for equipment access doors and panels.

1.8 EXTRA MATERIALS A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Spares: For the following:

- a. Potential Transformer Fuses: 1% but not less than one of each type.
- b. Control-Power Fuses: 1% but not less than one of each type.
- c. Fuses and Fusible Devices for Fused Circuit Breakers: 1% but not less than one of each type.
- d. Fuses for Fusible Switches: 1% but not less than one of each type.
- e. Fuses for Fused Power Circuit Devices: 1% but not less than one of each type.

2. Spare Indicating Lights: Six of each type installed.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.

### 2.2 FUSIBLE AND NONFUSIBLE SWITCHES

A. Manufacturers:

1. General Electric Co.; Electrical Distribution & Control Division.

2. Square D/Group Schneider.

B. Fusible Switch, 1200 A and Smaller: NEMA KS 1, Type HD, with clips or bolt pads to accommodate specified fuses, lockable handle with capability to accept two padlocks, and interlocked with cover in closed position.

C. Nonfusible Switch, 1200 A and Smaller: NEMA KS 1, Type HD, lockable handle with capability to accept two padlocks, and interlocked with cover in closed position.

D. Accessories:

1. Equipment Ground Kit: Internally mounted and labeled for copper and aluminum ground conductors.

2. Neutral Kit: Internally mounted; insulated, capable of being grounded, and bonded; and labeled for copper and aluminum neutral conductors.

3. Auxiliary Contact Kit: Auxiliary set of contacts arranged to open before switch blades open.

### 2.3 FUSED POWER CIRCUIT DEVICES

A. Bolted-Pressure Contact Switch: UL 977; operating mechanism shall use a rotary-mechanical-bolting action to produce and maintain high-clamping pressure on the switch blade after it engages the stationary contacts.

1. Manufacturers:

a. Boltswitch, Inc.

b. General Electrical.

c. Square D/Group Schneider.

B. High-Pressure, Butt-Type Contact Switch: UL 977; operating mechanism shall use butt-type contacts and a spring-charged mechanism to produce and maintain high-contact pressure when switch is closed.

1. Manufacturers:

a. General Electric Co.; Electrical Distribution & Control Division.

b. Square D/Group Schneider.

2. Main Contact Interrupting Capability: Twelve times the switch current rating, minimum.

3. Operating Mechanism: Manual handle operation to close switch stores energy in mechanism for closing and opening.

a. Electrical Trip: Operation of lever or push-button trip switch, or trip signal from ground-fault relay or remote-control device, causes switch to open.

b. Mechanical Trip: Operation of mechanical lever or push button or another device causes switch to open.

4. Auxiliary Switches: Factory installed, SPDT, with leads connected to terminal block, and including one set more than quantity required for functional performance indicated.

5. Service-Rated Switches: Labeled for use as service equipment.

6. Ground-Fault Relay: Comply with UL 1053. Self-powered type with mechanical ground-fault indicator, test function, tripping relay with internal memory, and three-phase current transformer/sensor.

a. Configuration: Remote-mounted relay and trip unit with adjustable pickup and time-delay settings, push-to-test feature, and ground fault indicator.

b. Internal Memory: Integrates the cumulative value of intermittent arcing ground-fault currents and uses the effect to initiate tripping.

c. No-Trip Relay Test: Operation of "no-trip" test control permits ground-fault simulation test without tripping switch.

d. Test Control: Simulates ground fault to test relay and switch (or relay only if "no-trip" mode is selected).

7. Open-Fuse Trip Device: Arranged to trip switch open if a phase fuse opens.

### 2.4 MOLDED-CASE CIRCUIT BREAKERS AND SWITCHES

A. Manufacturers:

1. General Electric Co.; Electrical Distribution & Control Division.

2. Square D/Group Schneider.

- B. Molded-Case Circuit Breaker: NEMA AB 1, with interrupting capacity to meet available fault currents.
1. Thermal-Magnetic Circuit Breakers: Inverse time-current element for low-level overloads and instantaneous magnetic trip element for short circuits. Adjustable magnetic trip setting for circuit-breaker frame sizes 250 A and larger.
  2. Adjustable Instantaneous-Trip Circuit Breakers: Magnetic trip element with front-mounted, field-adjustable trip setting.
  3. Electronic Trip-Unit Circuit Breakers: RMS sensing; field-replaceable rating plug; with the following field-adjustable settings:
    - a. Instantaneous trip.
    - b. Long- and short-time pickup levels.
    - c. Long- and short-time time adjustments.
    - d. Ground-fault pickup level, time delay, and  $I^2t$  response.
  4. Current-Limiting Circuit Breakers: Frame sizes 400 A and smaller and let-through ratings less than NEMA FU 1, RK-5.
  5. Integrally Fused Circuit Breakers: Thermal-magnetic trip element with integral limiter-style fuse listed for use with circuit breaker and trip activation on fuse opening or on opening of fuse compartment door.
  6. GFCI Circuit Breakers: Single- and two-pole configurations with 5-mA trip sensitivity.
- C. Molded-Case Circuit-Breaker Features and Accessories:
1. Standard frame sizes, trip ratings, and number of poles.
  2. Lugs: Mechanical style suitable for number, size, trip ratings, and conductor material.
  3. Application Listing: Type SWD for switching fluorescent lighting loads; Type HACR for heating, air-conditioning, and refrigerating equipment.
  4. Ground-Fault Protection: Integrally mounted relay and trip unit with adjustable pickup and time-delay settings, push-to-test feature, and ground-fault indicator.
  5. Shunt Trip: 120-V trip coil energized from separate circuit, set to trip at 55 percent of rated voltage.
  6. Undervoltage Trip: Set to operate at 35 to 75 percent of rated voltage with field-adjustable 0.1- to 0.6-second time delay.
  7. Auxiliary Switch: Two SPDT switches with "a" and "b" contacts; "a" contacts mimic circuit-breaker contacts, "b" contacts operate in reverse of circuit-breaker contacts.
  8. Key Interlock Kit: Externally mounted to prohibit circuit-breaker operation; key shall be removable only when circuit breaker is in off position.
  9. Zone-Selective Interlocking: Integral with electronic trip unit; for interlocking ground-fault protection function.
- D. Molded-Case Switches: Molded-case circuit breaker with fixed, high-set instantaneous trip only, and short-circuit withstand rating equal to equivalent breaker frame size interrupting rating.
- E. Molded-Case Switch Accessories:
1. Lugs: Mechanical style suitable for number, size, trip ratings, and material of conductors.
  2. Application Listing: Type HACR for heating, air-conditioning, and refrigerating equipment.
  3. Shunt Trip: 120-V trip coil energized from separate circuit, set to trip at 55 percent of rated voltage. Provide "dummy" trip unit where required for proper operation.
  4. Undervoltage Trip: Set to operate at 35 to 75 percent of rated voltage with field-adjustable 0.1- to 0.6-second time delay. Provide "dummy" trip unit where required for proper operation.
  5. Auxiliary Switch: Two SPDT switches with "a" and "b" contacts; "a" contacts mimic circuit-breaker contacts, "b" contacts operate in reverse of circuit-breaker contacts.
  6. Key Interlock Kit: Externally mounted to prohibit operation; key shall be removable only when switch is in off position.

## 2.5 ENCLOSURES

- A. NEMA AB 1 and NEMA KS 1 to meet environmental conditions of installed location.

1. Outdoor Locations: NEMA 250, Type 3R.
2. Kitchen Areas: NEMA 250, Type 4X, stainless steel.
3. Other Wet or Damp Indoor Locations: NEMA 250, Type 4.
4. Hazardous Areas Indicated on Drawings: NEMA 250, Type 7C.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine elements and surfaces to receive enclosed switches and circuit breakers for compliance with installation

tolerances and other conditions affecting performance.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 CONCRETE BASES

A. Coordinate size and location of concrete bases. Verify structural requirements with structural engineer.

B. Concrete base is specified in Division 16 Section "Basic Electrical Materials and Methods," and concrete materials and installation requirements are specified in Division 3.

### 3.3 INSTALLATION

A. Comply with applicable portions of NECA 1, NEMA PB 1.1, and NEMA PB 2.1 for installation of enclosed switches and circuit breakers.

B. Mount individual wall-mounting switches and circuit breakers with tops at uniform height, unless otherwise indicated. Anchor floor-mounting switches to concrete base.

C. Comply with mounting and anchoring requirements specified in Division 16 Section "Seismic Controls for Electrical Work."

D. Temporary Lifting Provisions: Remove temporary lifting eyes, channels, and brackets and temporary blocking of moving parts from enclosures and components.

### 3.4 IDENTIFICATION

A. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs as specified in Division 16 Section "Electrical Identification."

B. Enclosure Nameplates: Label each enclosure with engraved metal or laminated-plastic nameplate as specified in Division 16 Section "Electrical Identification."

### 3.5 FIELD QUALITY CONTROL

A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect field-assembled components and equipment installation, including connections. Report results in writing.

1. Inspect mechanical and electrical connections.

2. Verify switch and relay type and labeling verification.

3. Verify rating of installed fuses.

B. Perform the following field tests and inspections and prepare test reports:

1. Perform each electrical test and visual and mechanical inspection stated in NETA ATS, Section 7.5 for switches and Section 7.6 for molded-case circuit breakers. Certify compliance with test parameters.

2. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.

3. Infrared Scanning:

a. Initial Infrared Scanning: After Substantial Completion, but not more than 60 days after Final Acceptance, perform an infrared scan of each enclosed switch and circuit breaker. Open or remove doors or panels so connections are accessible to portable scanner.

b. Follow-Up Infrared Scanning: Perform an additional follow-up infrared scan of each unit 11 months after date of Substantial Completion.

c. Instruments, Equipment and Reports:

1) Use an infrared scanning device designed to measure temperature or to detect significant deviations from normal values. Provide calibration record for device.

2) Prepare a certified report that identifies enclosed switches and circuit breakers included and describes scanning results. Include notation of deficiencies detected, remedial action taken, and observations after remedial action.

### 3.6 ADJUSTING

A. Set field-adjustable switches and circuit-breaker trip ranges.

### 3.7 CLEANING

A. On completion of installation, vacuum dirt and debris from interiors; do not use compressed air to assist in cleaning.

B. Inspect exposed surfaces and repair damaged finishes.

**END OF SECTION 16410**

## SECTION 16442 - PANELBOARDS

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

#### 1.2 SUMMARY

A. This Section includes the following:

1. Distribution panelboards.
2. Lighting and appliance branch-circuit panelboards.

#### 1.3 DEFINITIONS

- A. EMI: Electromagnetic interference.
- B. GFCI: Ground-fault circuit interrupter.
- C. RFI: Radio-frequency interference.
- D. RMS: Root mean square.
- E. SPDT: Single pole, double throw.

#### 1.4 SUBMITTALS

A. Product Data: For each type of panelboard, overcurrent protective device, accessory, and component indicated. Include dimensions and manufacturers' technical data on features, performance, electrical characteristics, ratings, and finishes.

B. Shop Drawings: For each panelboard and related equipment.

1. Dimensioned plans, elevations, sections, and details. Show tabulations of installed devices, equipment features, and ratings. Include the following:

- a. Enclosure types and details for types other than NEMA 250, Type 1.
- b. Bus configuration, current, and voltage ratings.
- c. Short-circuit current rating of panelboards and overcurrent protective devices. Features, characteristics, ratings, and factory settings of individual overcurrent protective devices and auxiliary components.

2. Wiring Diagrams: Power, signal, and control wiring.

C. Field quality-control test reports including the following:

1. Test procedures used.
  2. Test results that comply with requirements.
  3. Results of failed tests and corrective action taken to achieve test results that comply with requirements.
- D. Panelboard Schedules: For installation in panelboards. Submit final versions after load balancing.

E. Operation and Maintenance Data: For panelboards and components to include in emergency, operation, and maintenance manuals.

1. Manufacturer's written instructions for testing and adjusting overcurrent protective devices.
2. Time-current curves, including selectable ranges for each type of overcurrent protective device.

#### 1.5 QUALITY ASSURANCE

A. Source Limitations: Obtain panelboards, overcurrent protective devices, components, and accessories through one source from a single manufacturer.



- B. Product Options: Drawings indicate size, profiles, and dimensional requirements of panelboards and are based on the specific system indicated
- C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- D. Comply with NEMA PB 1.
- E. Comply with NFPA 70.

#### 1.6 PROJECT CONDITIONS

A. Environmental Limitations: Rate equipment for continuous operation under the following conditions, unless otherwise indicated:

1. Ambient Temperature: Not exceeding 104 deg F.
2. Altitude: Not exceeding 6600 feet.

#### 1.7 COORDINATION

A. Coordinate layout and installation of panelboards and components with other construction that penetrates walls or is supported by them, including electrical and other types of equipment, raceways, piping, and encumbrances to workspace clearance requirements.

#### 1.8 EXTRA MATERIALS

A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Keys: Six spares for each type of panelboard cabinet lock.

### PART 2 - PRODUCTS

#### 2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Panelboards, Overcurrent Protective Devices, Controllers, Contactors, and Accessories:
  - a. General Electric Co.; Electrical Distribution & Protection Div.
  - b. Square D.
  - c. Eaton / Cutler Hammer

#### 2.2 MANUFACTURED UNITS

A. Fabricate and test panelboards according to IEEE 344 to withstand seismic forces defined in Division 16 Section "Seismic Controls for Electrical Work."

B. Enclosures: Flush- and surface-mounted cabinets. NEMA PB 1, Type 1.

1. Rated for environmental conditions at installed location.
  - a. Outdoor Locations: NEMA 250, Type 3R.
  - b. Kitchen Areas: NEMA 250, Type 4X, stainless steel.
  - c. Other Wet or Damp Indoor Locations: NEMA 250, Type 4.
2. Front: Secured to box with concealed trim clamps. For surface-mounted fronts, match box dimensions; for flush-mounted fronts, overlap box.
3. Finish: Manufacturer's standard enamel finish over corrosion-resistant treatment or primer coat.
4. Directory Card: With transparent protective cover, mounted in metal frame, inside panelboard door.

C. Phase and Ground Buses:

1. Material: Hard-drawn copper, 98 percent conductivity.
2. Equipment Ground Bus: Adequate for feeder and branch-circuit equipment ground conductors; bonded to box.
3. Isolated Equipment Ground Bus: Adequate for branch-circuit equipment ground conductors; insulated from box.

D. Conductor Connectors: Suitable for use with conductor material.

1. Main and Neutral Lugs: Compression type.
2. Ground Lugs and Bus Configured Terminators: Compression type.

E. Future Devices: Mounting brackets, bus connections, and necessary appurtenances required for future installation of devices.

### 2.3 PANELBOARD SHORT-CIRCUIT RATING

- A. Fully rated to interrupt symmetrical short-circuit current available at terminals.

### 2.4 DISTRIBUTION PANELBOARDS

- A. Doors: Secured with vault-type latch with tumbler lock; keyed alike. Omit for fused-switch panelboards.
- B. Main Overcurrent Protective Devices: Circuit breaker.
- C. Branch Overcurrent Protective Devices:
  1. For Circuit-Breaker Frame Sizes 125 A and Smaller: Bolt-on circuit breakers.
  2. For Circuit-Breaker Frame Sizes Larger Than 125 A: Bolt-on circuit breakers; plug-in circuit breakers where individual positive-locking device requires mechanical release for removal.

### 2.5 LIGHTING AND APPLIANCE BRANCH-CIRCUIT PANELBOARDS

- A. Branch Overcurrent Protective Devices: Bolt-on circuit breakers, replaceable without disturbing adjacent units.
- B. Doors: Concealed hinges; secured with flush latch with tumbler lock; keyed alike.

### 2.6 OVERCURRENT PROTECTIVE DEVICES

- A. Molded-Case Circuit Breaker: UL 489, with interrupting capacity to meet available fault currents.
  1. Thermal-Magnetic Circuit Breakers: Inverse time-current element for low-level overloads, and instantaneous magnetic trip element for short circuits. Adjustable magnetic trip setting for circuit-breaker frame sizes 250 A and larger.
  2. Adjustable Instantaneous-Trip Circuit Breakers: Magnetic trip element with front-mounted, field-adjustable trip setting.
  3. Electronic trip-unit circuit breakers shall have RMS sensing; field-replaceable rating plug; and with the following field-adjustable settings:
    - a. Instantaneous trip.
    - b. Long- and short-time pickup levels.
    - c. Long- and short-time time adjustments.
    - d. Ground-fault pickup level, time delay, and  $I^2t$  response.
  4. Current-Limiting Circuit Breakers: Frame sizes 400 A and smaller; let-through ratings less than NEMA FU 1, RK-5.
  5. Integrally Fused Circuit Breakers: Thermal-magnetic trip element with integral limiter-style fuse listed for use with circuit breaker; trip activation on fuse opening or on opening of fuse compartment door.
  6. GFCI Circuit Breakers: Single- and two-pole configurations with 5-mA trip sensitivity.
- B. Molded-Case Circuit-Breaker Features and Accessories: Standard frame sizes, trip ratings, and number of poles.
  1. Lugs: Mechanical style, suitable for number, size, trip ratings, and conductor materials.
  2. Application Listing: Appropriate for application; Type SWD for switching fluorescent lighting loads; Type HACR for heating, air-conditioning, and refrigerating equipment.
  3. Ground-Fault Protection: Integrally mounted relay and trip unit with adjustable pickup and time-delay settings, push-to-test feature, and ground-fault indicator.
  4. Shunt Trip: 120-V trip coil energized from separate circuit, set to trip at [55] [75] percent of rated voltage.
  5. Multipole units enclosed in a single housing or factory-assembled to operate as a single unit.

### 2.7 ACCESSORY COMPONENTS AND FEATURES

- A. Furnish accessory set including tools and miscellaneous items required for overcurrent protective device test, inspection, maintenance, and operation.

## 2.8 TVSS DEVICES

- A. Integrally mounted in panelboard.
- B. See panel schedule for Transient Voltage Suppression requirements.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Install panelboards and accessories according to NEMA PB 1.1.
- B. Mount top of trim 74 inches above finished floor, unless otherwise indicated.
- C. Mount plumb and rigid without distortion of box. Mount recessed panelboards with fronts uniformly flush with wall finish.
- D. Install overcurrent protective devices and controllers.
  - 1. Set field-adjustable switches and circuit-breaker trip ranges.
- E. Install filler plates in unused spaces.
- F. Stub four 1-inch empty conduits from panelboard into accessible ceiling space or space designated to be ceiling space in the future. Stub four 1-inch empty conduits into raised floor space or below slab not on grade.
- G. Arrange conductors in gutters into groups and bundle and wrap with wire ties after completing load balancing.
- H. ALL panel cans and covers with-in the same space shall be the same height.

### 3.2 IDENTIFICATION

- A. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs as specified in Division 16 Section "Electrical Identification."
- B. Create a directory to indicate installed circuit loads after balancing panelboard loads. Obtain approval before installing. Use a computer or typewriter to create directory; handwritten directories are not acceptable. Provide room being served identification for each circuit.
- C. Panelboard Nameplates: Label each panelboard with engraved metal or laminated-plastic nameplate mounted with corrosion-resistant screws.

### 3.3 CONNECTIONS

- A. Ground equipment according to Division 16 Section "Grounding and Bonding."
- B. Connect wiring according to Division 16 Section "Conductors and Cables."

### 3.4 FIELD QUALITY CONTROL

- A. Prepare for acceptance tests as follows:
  - 1. Test insulation resistance for each panelboard bus, component, connecting supply, feeder, and control circuit.
  - 2. Test continuity of each circuit.
- B. Testing Agency: Engage a qualified testing and inspecting agency to perform the following field tests and inspections and prepare test reports:
- C. Perform the following field tests and inspections and prepare test reports:
  - 1. Perform each electrical test and visual and mechanical inspection stated in NETA ATS, Section 7.5 for switches and Section 7.6 for molded-case circuit breakers. Certify compliance with test parameters.
  - 2. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.
- D. Load Balancing: After Substantial Completion, but not more than 60 days after Final Acceptance, measure load balancing and make circuit changes.
  - 1. Measure as directed during period of normal system loading.
  - 2. Perform load-balancing circuit changes outside normal occupancy/working schedule of the facility and at time directed. Avoid disrupting critical 24-hour services such as fax machines and on-line data processing, computing, transmitting, and receiving equipment.
  - 3. After circuit changes, recheck loads during normal load period. Record all load readings before and after changes and submit test records.
  - 4. Tolerance: Difference exceeding 20 percent between phase loads, within a panelboard, is not acceptable. Rebalance

and recheck as necessary to meet this minimum requirement.

- E. Infrared Scanning: After Substantial Completion, but not more than 60 days after Final Acceptance, perform an infrared scanning of each panelboard. Remove panel fronts so joints and connections are accessible to portable scanner.
1. Follow-up Infrared Scanning: Perform an additional follow-up infrared scan of each panelboard 11 months after date of Substantial Completion.
  2. Instrument: Use an infrared scanning device designed to measure temperature or to detect significant deviations from normal values. Provide calibration record for device.
  3. Record of Infrared Scanning: Prepare a certified report that identifies panelboards checked and describes scanning results. Include notation of deficiencies detected, remedial action taken, and observations after remedial action.

### 3.5 CLEANING

- A. On completion of installation, inspect interior and exterior of panelboards. Remove paint splatters and other spots. Vacuum dirt and debris; do not use compressed air to assist in cleaning. Repair exposed surfaces to match original finish.

## END OF SECTION 16442

## SECTION 16512 - LED INTERIOR LIGHTING

### PART 1 – GENERAL

#### 1.1 SUMMARY

- A. Section Includes:
1. Interior solid-state luminaires that use LED technology.
  2. Lighting fixture supports.
- B. Related Requirements.

#### 1.2 DEFINITIONS

- A. CCT: Correlated color temperature.
- B. CRI: Color Rendering Index.
- C. Fixture: See "Luminaire".
- D. IP: International Protection or Ingress Protection Rating.
- E. LED: Light-emitting diode.
- F. Lumen: Measured output of lamp and luminaire, or both.
- G. Luminaire: Complete lighting unit, including lamp, reflector, and housing.

#### 1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product, arranged by designation.
- B. Shop Drawings: For nonstandard or custom luminaires.
1. Include plans, elevations, sections, and mounting and attachment details.
  2. Include details of luminaire assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
  3. Include diagrams for power, signal, and control wiring.
- C. Product Schedule: For luminaires and lamps. (**See Plans.**)

#### 1.4 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings: Reflected ceiling plan(s) and other details, drawn to scale and coordinated with each other, using input from installers of the items involved:
- B. Seismic Qualification Certificates: For luminaires, accessories, and components, from manufacturer.
- C. Product Certificates: For each type of luminaire.
- D. Sample warranty.

#### 1.5 CLOSEOUT SUBMITTALS

- A. Operation and maintenance data.

#### 1.6 WARRANTY

- A. Warranty: Manufacturer and Installer agree to repair or replace components of luminaires that fail in materials or

workmanship within specified warranty period.

B. Warranty Period: **Seven (7)** years from date of Substantial Completion.

#### 1.7 EXTRA MATERIALS

A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Plastic Diffusers and Lenses: 1 for every 100 of each type and rating installed. Furnish at least one of each type.

2. Battery and Charger Data: One for each emergency lighting unit.

3. Globes and Guards: 1 for every 20 of each type and rating installed. Furnish at least one of each type.

### PART 2 – PRODUCTS

#### 2.1 LUMINAIRE REQUIREMENTS

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. NRTL Compliance: Luminaires for hazardous locations shall be listed and labeled for indicated class and division of hazard by an NRTL.

C. FM Global Compliance: Luminaires for hazardous locations shall be listed and labeled for indicated class and division of hazard by FM Global.

D. Recessed Fixtures: Comply with NEMA LE 4.

E. Lamps dimmable from 100 percent to 0 percent of maximum light output.

F. Internal driver.

G. Nominal Operating Voltage: **Field verify. All fixtures shall be rated 120VAC – 277VAC**

1. Lens Thickness: At least 0.125 inch (3.175 mm) minimum unless otherwise indicated.

#### 2.2 MATERIALS

A. Metal Parts:

1. Free of burrs and sharp corners and edges.

2. Sheet metal components shall be steel unless otherwise indicated.

3. Form and support to prevent warping and sagging

B. Doors, Frames, and Other Internal Access: Smooth operating, free of light leakage under operating conditions, and designed to permit relamping without use of tools. Designed to prevent doors, frames, lenses, diffusers, and other components from falling accidentally during relamping and when secured in operating position.

C. Diffusers, and Globes:

1. Acrylic: One hundred percent virgin acrylic plastic, with high resistance to yellowing and other changes due to aging, exposure to heat, and UV radiation.

2. Glass: Annealed crystal glass unless otherwise indicated.

3. Lens Thickness: At least 0.125 inch (3.175 mm) minimum unless otherwise indicated.

#### 2.3 METAL FINISHES

A. Variations in finishes are unacceptable in the same piece. Variations in finishes of adjoining components are acceptable if they are within the range of approved Samples and if they can be and are assembled or installed to minimize contrast.

#### 2.4 LUMINAIRE SUPPORT COMPONENTS

A. Single-Stem Hangers: 1/2-inch (13-mm) steel tubing with swivel ball fittings and ceiling canopy. Finish same as luminaire.

B. Wires: ASTM A 641/A 641 M, Class 3, soft temper, zinc-coated steel.

C. Rod Hangers: 3/16-inch (5-mm) minimum diameter, cadmium-plated, threaded steel rod.

D. Hook Hangers: Integrated assembly matched to luminaire, line voltage, and equipment with threaded attachment, cord, and locking-type plug.

### PART 3 – EXECUTION

#### 3.1 INSTALLATION

- A. Comply with NECA 1.
- B. Install luminaires level, plumb, and square with ceilings and walls unless otherwise indicated.
- C. Install lamps in each luminaire.
- D. Supports: Sized and rated for luminaire weight.
- E. Flush-Mounted Luminaire Support: Secured to outlet box.
- F. Suspended Luminaire Support:
  - 1. Pendants and Rods: Where longer than 48 inches (1200 mm), brace to limit swinging.
  - 2. Stem-Mounted, Single-Unit Luminaires: Suspend with four-stem hangers. Support with approved outlet box and accessories that hold stem and provide damping of luminaire oscillations. Support outlet box vertically to building structure using approved devices.
  - 3. Continuous Rows of Luminaires: Use tubing or stem for wiring at one point and **rod** for suspension for each unit length of luminaire chassis, including one at each end.
  - 4. Do not use ceiling grid as support for pendant luminaires. Connect support wires or rods to building structure.
- G. Ceiling-Grid-Mounted Luminaires:
  - 1. Secure to any required outlet box.
  - 2. Secure luminaire using approved fasteners in a minimum of four locations, spaced near corners of luminaire.

### 3.2 FIELD QUALITY CONTROL

- A. Perform the following tests and inspections:
  - 1. Operational Test: After installing luminaires, switches, and accessories, and after electrical circuitry has been energized, test units to confirm proper operation.
  - 2. Test for Emergency Lighting: Interrupt power supply to demonstrate proper operation. Verify transfer from normal power to battery power and retransfer to normal.
- B. Luminaire will be considered defective if it does not pass operation tests and inspections.
- C. Prepare test and inspection reports.

### VOICE AND DATA COMMUNICATION CABLING AND DEVICES

Contractor shall relocate the existing data drops as called for in the plans.

Provide raceways and boxes as needed.

Data drops relocated to block walls shall be in wire mold.

### PROTECTION OF EQUIPMENT AND MATERIALS:

The contractor shall at all times take such precautions as may be necessary to properly protect all equipment and materials from damage; failure on the part of the contractor to comply with the above to the entire satisfaction of the University will be sufficient cause for rejection of the particular piece of equipment in question.

### FIRE ALARM

The University will relocate the (2) two existing fire alarm strobes on end walls as needed.

### PROTECTION OF EQUIPMENT AND MATERIALS:

The contractor shall at all times take such precautions as may be necessary to properly protect all equipment and materials from damage; failure on the part of the contractor to comply with the above to the entire satisfaction of the University will be sufficient cause for rejection of the particular piece of equipment in question.

### END OF SECTION

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**ALTERNATES****Alternate No. 1 – Add to furnish and install (6) new roof curbs and associated roof work.****GENERAL NOTES: PHASE 1-ALTERNATE NO.1**

1. FURNISH AND INSTALL (6) NEW ROOF CURBS AND ASSOCIATED ROOF WORK.
2. INSTALL NEW ROOF CURBS FOR EF-2-1, EF-2-2, EF-2-3, EF-2-4, DOAS 1 & DOAS 3 ROOF CURB FOR FRESH AIR INTAKE, AND DOAS 2 & 4 ROOF CURB FOR FRESH AIR INTAKE WHERE SHOWN ON ROOF AND PER THE DETAILS ON PLAN SHEET A3. COORDINATE WITH MECHANICAL CONTRACTOR FOR CURB LOCATIONS AND SIZES.
3. ALL CURBS SHALL SIT ON AND ANCHOR TO EXISTING METAL DECKING. ALL CURBS SHALL BE A MINIMUM HEIGHT OF 8" ABOVE FINISH ROOF.
4. AT EACH CURB FOR DUCT PENETRATION, CUT EXISTING DECK THE SIZE REQUIRED FOR DUCT TO PASS ONLY. DO NOT CUT OUT ALL OF DECKING FOR CURB SIZE. AFTER DUCT INSTALLATION THROUGH DECKING, SEAL DUCT AT DECKING AND INSTALL 6" OF UNFACED FIBERGLASS INSULATION IN CURB PRIOR TO INSTALLING CURB CAP.
5. NOTE THAT COLD APPLIED ROOF FLASHING SYSTEM IS NOT ACCEPTED. INSTALL HEATWELD DYNACLAD SYSTEM FOR ALL FLASHING, ROOF REPAIRS, AND NEW ROOF WORK.

**Alternate No. 2 – Add to furnish and install new light fixtures and exit light in room 201.****ELECTRICAL NOTES: PHASE 1 – ALTERNATE NO.2**

1. FURNISH AND INSTALL NEW LIGHT FIXTURES AND EXIT SIGN IN ROOM 201.
2. FURNISH AND INSTALL NEW 2' x 4' LED LAY-IN LIGHT FIXTURES (LITHONIA - 2FSL4 40L EZ1 LP835) IN CEILING AS SHOWN ON PLANS. CONNECT TO EXISTING CIRCUIT IN EXISTING PANEL "HC" CIRCUIT 12.
3. FURNISH AND INSTALL NEW 2' x 4' LED LAY-IN EMERGENCY LIGHT FIXTURES (LITHONIA - 2FSL4 40L EZ1 LP835 N80EMG EL14L) IN NEW CEILING AS SHOWN ON PLANS. CONNECT TO EXISTING EMERGENCY POWER CIRCUIT (XHA-3,4).
4. FURNISH AND INSTALL A NEW WALL MOUNTED LED EXIT LIGHT (LITHONIA-LQC W 1 G EL N-LED) WHERE SHOWN AND CONNECT TO EXISTING EMERGENCY POWER CIRCUIT (XHA-3,4).
5. CONNECT NEW LIGHT FIXTURES TO NEW WALL SWITCHES AND EXISTING CIRCUIT.
6. MC CABLE ACCEPTABLE WHERE PERMISSIBLE.

**Alternate No. 3 – Add to install new vinyl plank flooring and base in room 201.****GENERAL NOTES: PHASE 1 - ALTERNATE NO.3**

1. FURNISH AND INSTALL NEW VINYL PLANK FLOORING AND VINYL BASE THROUGHOUT ROOM 201.
2. REMOVE EXISTING CARPET AND GLUE IN ROOM 201.
3. CONTRACTOR SHALL PREP EXISTING CONCRETE FLOOR, APPLY FLOOR PATCH WHERE NECESSARY TO ACHIEVE MANUFACTURER'S RECOMMENDATIONS (AT NO COST TO THE UNIVERSITY).
4. FURNISH AND INSTALL NEW LUXURY VINYL PLANK (EARTHWERKS PORTIA - VANITY POR 734) IN ROOM 201 BY GLUE DOWN METHOD. PROVIDE A TRANSITION STRIP AT ROOM 201 ENTRANCE DOOR (IF NEEDED. CONSULT ULL). INSTALL 4" VINYL BASE (COLOR: BLACK) THROUGHOUT ROOM 201. INSTALL MOLDED OUTSIDE CORNERS FOR BASE. PROTECT NEW FLOOR FROM DAMAGE DURING THE INSTALLATION OF THE NEW LAB EQUIPMENT AND DURING CONSTRUCTION.

**GENERAL CLEAN-UP**

The general Contractor shall be responsible for providing a dumpster and for the proper disposal of all work associated debris at an appropriate (for the type of debris), approved landfill.

The general Contractor shall be responsible for leaving the space, free of dust and mopped clean.

All surfaces shall be wiped down and free of dust.

**END OF SECTION**

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## INSTRUCTIONS TO BIDDERS

[https://www.doa.la.gov/.../24\\_Instructions\\_to\\_Bidders\\_July2018.docx](https://www.doa.la.gov/.../24_Instructions_to_Bidders_July2018.docx)

### ARTICLE 1

#### DEFINITIONS

1.1 The Bid Documents include the following:

- Advertisement for Bids (if applicable)
- Instructions to Bidders
- Bid Form
- Bid Bond Instruction
- General Conditions of the Contract for Construction,
- AIA Document A201, 2017 Edition
- Supplementary Conditions
- Contract Between Owner and Contractor and Performance and Payment Bond
- Mandatory Affidavits
- User Agency Documents (if applicable)
- Change Order Form (if applicable)
- Partial Occupancy Form (if applicable)
- Recommendation of Acceptance (if applicable)
- Asbestos Abatement (if applicable)
- Other Documents (if applicable)
- Specifications & Drawings
- Addenda issued during the bid period and acknowledged on the Bid Form (if applicable)

1.2 All definitions set forth in the General Conditions of the Contract for Construction, AIA Document A201 and the Supplementary Conditions are applicable to the Bid Documents.

1.3 Addenda are written and/or graphic instruments issued by the Architect or Purchasing Office prior to the opening of bids, which modify or interpret the Bid Documents by additions, deletions, clarifications, corrections and prior approvals.

1.4 A bid is a complete and properly signed proposal to do the work or designated portion thereof for the sums stipulated therein supported by data called for by the Bid Documents.

1.5 Base bid is the sum stated in the bid for which the Bidder offers to perform the work described as the base, to which work may be added, or deleted for sums stated in alternate bids.

1.6 An alternate bid (or alternate) is an amount stated in the bid to be added to the amount of the base bid if the corresponding change in Project scope or materials or methods of construction described in the Bid Documents is accepted.

1.7 A Bidder is one who submits a bid for a prime Contract with the Owner for the work described in the Bid Documents.

1.8 A Sub-bidder is one who submits a bid to a Bidder for materials and/or labor for a portion of the work.

1.9 Where the word "Architect" is used in any of the documents, it shall refer to the Prime Designer of the Project, regardless of discipline.

### ARTICLE 2

#### PRE-BID CONFERENCE

2.1 A Pre-Bid Conference shall be held at least 10 days before the date for receipt for bids. The Architect shall coordinate the setting of the date, time and place for the Pre-Bid Conference with the User Agency and shall notify in writing the Owner and all who have received sets of the Bid Documents to attend. The purpose of the Pre-Bid Conference is to familiarize Bidders with the requirements of the Project and the intent of the Bid Documents, and to receive comments and information from interested Bidders. If the Pre-Bid Conference is stated in the Advertisement for Bids to be a Mandatory Pre-Bid Conference, bids shall be accepted only from those bidders who attend the Pre-Bid Conference.



Contractors who are not in attendance for the **entire** Pre-Bid Conference will be considered to have not attended.

2.2 Any revision of the Bid Documents made as a result of the Pre-Bid Conference shall not be valid unless included in an addendum.

### **ARTICLE 3**

#### **BIDDER'S REPRESENTATION**

3.1 Each Bidder by making his bid represents that:

3.1.1 He has read and understands the Bid Documents and his bid is made in accordance therewith.

3.1.2 He has visited the site and has familiarized himself with the local conditions under which the work is to be performed.

3.1.3 His bid is based solely upon the materials, systems and equipment described in the Bid Documents as advertised and as modified by addenda.

3.1.4 His bid is not based on any verbal instructions contrary to the Bid Documents and addenda.

3.1.5 He is familiar with Code of Governmental Ethics requirement that prohibits public servants and/or their immediate family members from bidding on or entering into contracts; he is aware that the Designer and its principal owners are considered Public Servants under the Code of Governmental Ethics for the limited purposes and scope of the Design Contract with the State on this Project (see Ethics Board Advisory Opinion, No. 2009-378 and 2010-128); and neither he nor any principal of the Bidder with a controlling interest therein has an immediate family relationship with the Designer or any principal within the Designer's firm (see La. R.S. 42:1113). Any Bidder submitting a bid in violation of this clause shall be disqualified and any contract entered into in violation of this clause shall be null and void.

3.2 The Bidder must be fully qualified under any State or local licensing law for Contractors in effect at the time and at the location of the work before submitting his bid. In the State of Louisiana, Revised Statutes 37:2150, et seq. will be considered, if applicable.

The Contractor shall be responsible for determining that all of his Sub-bidders or prospective Subcontractors are duly licensed in accordance with law.

### **ARTICLE 4**

#### **BID DOCUMENTS**

4.1 Copies

4.1.1 Bid Documents may be obtained from the Architect for a deposit as stated in the Advertisement for Bids. The deposit will be refunded as stated in the Advertisement for Bids. No deposits will be refunded on Bid Documents returned later than ten days after receipt of bids.

4.1.1.2 As an alternative method of distribution, the Designer may provide the Bid Documents in electronic format. They may be obtained without charge and without deposit as stated in the Advertisement for Bids.

4.1.1.2.1 If electronic distribution is available, printed copies will not be available from the Designer, but arrangements can be made to obtain them through most reprographic firms and/or plan rooms.

4.1.1.2.2 If electronic distribution is available, the reproduction cost on the first paper plan set acquired by bona fide prime bidders will be fully refunded by the Designer upon delivery of the documents to the Designer in good condition no later than ten days after receipt of bids.

4.1.1.2.3 If electronic distribution is available, all other plan holders are responsible for their own reproduction costs.

**4.1.2 Complete sets of Bid Documents shall be used in preparing bids; neither the Owner nor the Architect assume any responsibility for errors or misinterpretations resulting from the use of incomplete sets of Bid Documents.**

4.1.3 The Owner or Architect in making copies of the Bid Documents available on the above terms, do so only for the

purpose of obtaining bids on the work and do not confer a license or grant for any other use.

#### 4.2 Interpretation or Correction of Bid Documents

4.2.1 Bidders shall promptly notify the Architect of any ambiguity, inconsistency or error which they may discover upon examination of the Bid Documents or of the site and local conditions.

4.2.2 Bidders requiring clarification or interpretation of the Bid Documents shall make a written request to the Architect, to reach him at least seven days prior to the date for receipt of bids.

4.2.3 Any interpretation, correction or change of the Bid Documents will be made by addendum. Interpretations, corrections or changes of the Bid Documents made in any other manner will not be binding and Bidders shall not rely upon such interpretations, corrections and changes.

#### 4.3 Substitutions

4.3.1 The materials, products and equipment described in the Bid Documents establish a standard of required function, dimension, appearance and quality to be met by any proposed substitution. No substitutions shall be allowed after bids are received.

4.3.2 No substitution will be considered unless written request for approval has been submitted by the Proposer and has been received by the Architect at least seven (7) working days prior to the opening of bids. (La. R.S. 38:2295(C)) Each such request shall include the name of the material or equipment for which it is to be substituted and a complete description of the proposed substitute including model numbers, drawings, cuts, performance and test data and any other information necessary for an evaluation. A statement setting forth any changes in other materials, equipment or work that incorporation of the substitute would require shall be included. It shall be the responsibility of the proposer to include in his proposal all changes required of the Bid Documents if the proposed product is used. Prior approval, if given, is contingent upon supplier being responsible for any costs which may be necessary to modify the space or facilities needed to accommodate the materials and equipment approved.

4.3.3 If the Architect approves any proposed substitution, such approval shall be set forth in an addendum. Bidders shall not rely upon approvals made in any other manner.

#### 4.4 Addenda

4.4.1 Addenda will be transmitted to all who are known by the Architect to have received a complete set of Bid Documents.

4.4.2 Copies of addenda will be made available for inspection wherever Bid Documents are on file for that purpose.

4.4.3 Except as described herein, addenda shall not be issued within a period of seventy-two (72) hours prior to the advertised time for the opening of bids, excluding Saturdays, Sundays, and any other legal holidays. If the necessity arises of issuing an addendum modifying plans and specifications within the seventy-two (72) hour period prior to the advertised time for the opening of bids, then the opening of bids shall be extended at least seven but no more than twenty-one (21) working days, without the requirement of re-advertising. UL Lafayette Purchasing shall be consulted prior to issuance of such an addendum and shall approve such issuance. The revised time and date for the opening of bids shall be stated in the addendum.

4.4.4 Each Bidder shall ascertain from the Architect prior to submitting his bid that he has received all addenda issued, and he shall acknowledge their receipt on the Bid Form.

4.4.5 The Owner shall have the right to extend the bid date by up to (30) thirty days without the requirement of re-advertising. Any such extension shall be made by addendum issued.

### ARTICLE 5

#### BID PROCEDURE

##### 5.1 Form and Style of Bids

5.1.1 Bids shall be submitted on the Louisiana Uniform Public Work Bid Form provided by the Architect for this Project.

- 5.1.2 The Bidder shall ensure that all applicable blanks on the bid form are completely and accurately filled in.
- 5.1.3 Bid sums shall be expressed in both words and figures, and in case of discrepancy between the two, the written words shall govern.
- 5.1.4 Any interlineation, alteration or erasure must be initialed by the signer of the bid or his authorized representative.
- 5.1.5 Bidders are cautioned to complete all alternates should such be required on the Bid Form. Failure to submit alternate prices will render the bid non responsive and shall cause its rejection.
- 5.1.6 Bidders are cautioned to complete all unit prices should such be required in the Bid Form. Unit prices represent a price proposal to do a specified quantity and quality of work. Unit prices are incorporated into the base bid or alternates, as indicated on the Unit Price Form, but are not the sole components thereof.
- 5.1.7 Bidder shall make no additional stipulations on the Bid Form nor qualify his bid in any other manner.
- 5.1.8 Written evidence of the authority of the person signing the bid for the public work shall be submitted in accordance with La. R.S. 38:2212 (B)(5).
- 5.1.9 On any bid in excess of fifty thousand dollars (\$50,000.00), the Contractor shall certify that he is licensed under La. R.S. 37: 2150-2173 and show his license number on the bid above his signature or his duly authorized representative.

## 5.2 Bid Security

5.2.1 No bid shall be considered or accepted unless the bid is accompanied by bid security in an amount of five percent (5.0%) of the base bid and all alternates.

The bid security shall be in the form of a certified check, cashier's check drawn on a bank insured by the Federal Deposit Insurance Corporation, or a Bid Bond written by a surety company licensed to do business in Louisiana and signed by the surety's agent or attorney-in-fact. The surety for the bond must meet the qualifications stated thereon. The Bid Bond shall include the legal name of the bidder be in favor of the University of Louisiana at Lafayette, and shall be accompanied by appropriate power of attorney. The Bid Bond must be signed by both the bidder/principal. Failure by the bidder/principal or the surety to sign the bid bond shall result in the rejection of the bid.

Bid security furnished by the Contractor shall guarantee that the Contractor will, if awarded the work according to the terms of his proposal, enter into the Contract and furnish Performance and Payment Bonds as required by these Bid Documents, within fifteen (15) days after written notice that the instrument is ready for his signature.

Should the Bidder refuse to enter into such Contract or fail to furnish such bonds, the amount of the bid security shall be forfeited to the Owner as liquidated damages, not as penalty.

5.2.2 The Owner will have the right to retain the bid security of Bidders until either (a) the Contract has been executed and bonds have been furnished, or (b) the specified time has elapsed so that bids may be withdrawn, or (c) all bids have been rejected.

## 5.3 Submission of Bids

***See Guidelines for Electronic Submission of Bids and Virtual Bid Openings included in this solicitation.***

### 5.3.1

~~The Bid shall be sealed in an opaque envelope. The bid envelope shall be identified on the outside the name, address, and license number of the Bidder.~~

~~The envelope shall not contain multiple bid forms, and will be received until the time specified and at the place specified in the Advertisement for Bids. It shall be the specific responsibility of the Bidder to deliver his sealed bid to The University at the appointed place and prior to the announced time for the opening of bids. Late delivery of a bid for any reason, including late delivery by United States Mail, or express delivery, shall disqualify the bid.~~

~~—If the bid is sent by mail, the sealed envelope shall be enclosed in a separate mailing envelope with the notation "Bid Enclosed" on the face thereof. Such bids shall be sent by Registered or Certified Mail, Return Receipt Requested, addressed to:~~

University of Louisiana at Lafayette  
Purchasing Department,  
P.O. Box 40197  
Lafayette, LA 70504

~~Bids sent by express delivery shall be delivered to:~~

~~—University of Louisiana at Lafayette—  
—Purchasing Department  
Martin Hall, Room 123  
104 University Circle  
Lafayette, LA 70503~~

**IMPORTANT: BIDS WILL NOT BE ACCEPTED BY U.S. MAIL OR IN-PERSON DELIVERY TO THE PURCHASING OFFICE. ANY REFERENCE TO SEALED ENVELOPES AND OR MAILED DOCUMENTS ARE TO BE DISREGARDED BY POTENTIAL BIDDERS. COURIER SERVICES SUCH AS UPS, FedEx, and DHL WIL NOT BE ABLE TO DELIVERY TO OUR PHYSICAL LOCATION AND THE BUILDING MAY BE LOCKED OR UNSTAFFED.**

5.3.2 Bids shall be deposited at the designated location prior to the time on the date for receipt of bids indicated in the Advertisement for Bids, or any extension thereof made by addendum. Bids received after the time and date for receipt of bids will be returned unopened.

5.3.3 Bidder shall assume full responsibility for timely delivery at location designated for receipt of bids.

5.3.4 Oral, telephonic or telegraphic bids are invalid and shall not receive consideration. Owner shall not consider notations written on outside of bid form ~~envelope~~ which have the effect of amending the bid. Written modifications enclosed in the bid ~~envelope~~, and signed or initialed by the Contractor or his representative, shall be accepted.

#### 5.4 Modification or Withdrawal of Bid

5.4.1 A bid may not be modified, withdrawn or canceled by the Bidder during the time stipulated in the Advertisement for Bids, for the period following the time and bid date designated for the receipt of bids, and Bidder so agrees in submitting his bid, except in accordance with R.S. 38:2214 which states, in part, "Bids containing patently obvious, unintentional, and substantial mechanical, clerical, or mathematical errors, or errors of unintentional omission of a substantial quantity of work, labor, material, or services made directly in the compilation of the bid, may be withdrawn by the contractor if clear and convincing sworn, written evidence of such errors is furnished to the public entity within forty- eight hours of the bid opening excluding Saturdays, Sundays, and legal holidays".

5.4.2 Prior to the time and date designated for receipt of bids, bids submitted early may be modified or withdrawn only by notice to the party receiving bids at the place and prior to the time designated for receipt of bids.

5.4.3 Withdrawn bids may be resubmitted up to the time designated for the receipt of bids provided that they are then fully in conformance with these Instructions to Bidders.

5.4.4 Bid Security shall be in an amount sufficient for the bid as modified or resubmitted.

#### 5.5 Prohibition of Discriminatory Boycotts of Israel

By submitting a bid, the bidder certifies and agrees that the following information is correct:

In preparing its bid, the bidder has considered all proposals submitted from qualified, potential subcontractors and suppliers, and has not, in the solicitation, selection, or commercial treatment of any subcontractor or supplier, refused to transact or terminated business activities, or taken other actions intended to limit commercial relations, with a person or entity that is engaging in commercial transactions in Israel or Israel-controlled territories, with the specific intent to accomplish a boycott or divestment of Israel. The bidder has also not retaliated against any person or other entity for reporting such refusal, termination, or commercially limiting actions. The state reserves the right to reject any bid if this certification is subsequently determined to be false and to terminate any contract awarded based on such a false response.

## ARTICLE 6 CONSIDERATION OF BIDS

## 6.1 Opening of Bids

***See Guidelines for Electronic Submission of Bids and Virtual Bid Openings on page 4 of this solicitation.***

6.1.1 The properly identified Bids received on time will be opened publicly and will be read aloud, and a tabulation abstract of the amounts of the base bids and alternates, if any, will be made available to Bidders.

## 6.2 Rejection of Bids

6.2.1 The Owner shall have the right to reject any or all bids and in particular to reject a bid not accompanied by any required bid security or data required by the Bid Documents or a bid in any way incomplete or irregular.

## 6.3 Acceptance of Bid

6.3.1 It is the intent of the Owner, if he accepts any alternates, to accept them in the order in which they are listed in the Bid Form. Determination of the Low Bidder shall be on the basis of the sum of the base bid and the alternates accepted. However, the Owner shall reserve the right to accept alternates in any order which does not affect determination of the Low Bidder.

# ARTICLE 7

## POST-BID INFORMATION

### 7.1 Submissions

7.1.1 At the Pre-Construction Conference, the Contractor shall submit the following information to the Architect.

7.1.1.1 A designation of the work to be performed by the Contractor with his own forces.

7.1.1.2 A breakdown of the Contract cost attributable to each item listed in the Schedule of Values Form (attached). No payments will be made to the Contractor until this is received.

7.1.1.3 The proprietary names and the suppliers of principal items or systems of material and equipment proposed for the work.

7.1.1.4 A list of names and business domiciles of all Subcontractors, manufacturers, suppliers or other persons or organizations (including those who are to furnish materials or equipment fabricated to a special design) proposed for the principal portions of the work. It is the preference of the Owner that, to the greatest extent possible or practical, the Contractor utilize Louisiana Subcontractors, manufacturers, suppliers and labor.

7.1.2 The General Contractor shall be responsible for actions or inactions of Subcontractors and/or material suppliers.

The General Contractor is totally responsible for any lost time or extra expense incurred due to a Subcontractor's or Material Supplier's failure to perform. Failure to perform includes, but is not limited to, a Subcontractor's financial failure, abandonment of the Project, failure to make prompt delivery, or failure to do work up to standard. Under no circumstances shall the Owner mitigate the General Contractor's losses or reimburse the General Contractor for losses caused by these events.

7.1.3 The lowest responsive and responsible bidder shall submit to the Architect and the Owner within ten days after the bid opening a letter/letters from the manufacturer stating that the manufacturer will issue the roof system guarantee complying with the requirements of Facility Planning and Control based on the specified roof system and include the name of the applicator acceptable to the manufacturer at the highest level of certification for installing the specified roof system. This manufacturer shall be one that has received prior approval or is named in the specifications.

In accordance with La. R.S. 38:2227 [references La R.S. 38:2212(A)(3)(c)(ii), which has since been renumbered as La R.S. 38:2212(B)(3)], La. R.S. 38:2212.10 and La. R.S. 23:1726(B) the apparent low bidder on this Project shall submit the completed Attestations Affidavit (Past Criminal Convictions of Bidders, Verification of Employees and Certification Regarding Unpaid Workers Compensation Insurance) form found within this bid package to the University of Louisiana at Lafayette within 10 days after the opening of bids.

# ARTICLE 8

## PERFORMANCE AND PAYMENT BOND

### 8.1 Bond Required

8.1.1 The Contractor shall furnish and pay for a Performance and Payment Bond written by a company licensed to do business in Louisiana, which shall be signed by the surety's agent or attorney-in-fact, in an amount equal to 100% of the Contract amount. Surety must be listed currently on the U. S. Department of Treasury Financial Management Service List

(Treasury List) as approved for an amount equal to or greater than the contract amount, or must be an insurance company domiciled in Louisiana or owned by Louisiana residents. If surety is qualified other than by listing on the Treasury list, the contract amount may not exceed fifteen percent of policyholders' surplus as shown by surety's most recent financial statements filed with the Louisiana Department of Insurance and may not exceed the amount of \$500,000. However, a Louisiana domiciled insurance company with at least an A- rating in the latest printing of the A. M. Best's Key Rating Guide shall not be subject to the \$500,000 limitation, provided that the contract amount does not exceed ten percent of policyholders' surplus as shown in the latest A. M. Best's Key Rating Guide nor fifteen percent of policyholders' surplus as shown by surety's most recent financial statements filed with the Louisiana Department of Insurance. The Bond shall be signed by the surety's agent or attorney-in-fact. The Bond shall be in favor of the University of Louisiana at Lafayette.

#### **8.2 Time of Delivery and Form of Bond**

8.2.1 The Bidder shall deliver the required bond to the Owner simultaneous with the execution of the Contract.

8.2.2 A surety company's bid bond form/document will be sufficient for any bid submission.

8.2.3 The Bidder shall require the Attorney-in-Fact who executes the required bond on behalf of the surety to affix thereto a certified and current copy of his power of Attorney.

### **ARTICLE 9**

#### **FORM OF AGREEMENT BETWEEN OWNER AND CONTRACTOR**

##### **9.1 Form to be Used**

9.1.1 Form of the Contract to be used shall be furnished by the University of Louisiana at Lafayette, an example of which is bound in the Bid Documents.

##### **9.2 Award**

9.2.1 After award of the Contract, the successful Bidder, if a corporation, shall furnish to the Owner the most current copy of a Disclosure of Ownership Affidavit on file with the Secretary of State.

9.2.2 In accordance with Louisiana Law, when the Contract is awarded, the successful Bidder shall, at the time of the signing of the Contract, execute the Non-Collusion Affidavit included in the Contract Documents

9.2.3 When this Project is financed either partially or entirely with State Bonds, the award of this Contract is contingent upon the sale of bonds by the State Bond Commission. The State shall incur no obligation to the Contractor until the Contract Between Owner and Contractor is duly executed.

#### **END OF SECTION**

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## SUPPLEMENTARY CONDITIONS

[https://www.doa.la.gov/.../27\\_Supplementary\\_Conditions\\_April2018.docx](https://www.doa.la.gov/.../27_Supplementary_Conditions_April2018.docx)

These Supplementary Conditions modify, change, delete from or add to the General Conditions of the Contract for Construction, AIA Document A201, 2017 Edition. Where any Article of the General Conditions is modified or any Section, Paragraph, Subparagraph or Clause thereof is modified or deleted by these supplements, the unaltered provisions of that Section, Article, Paragraph, Subparagraph or Clause shall remain in effect.

Articles, Sections, Paragraphs, Subparagraphs or Clauses modified or deleted have the same numerical designation as those occurring in the General Conditions.

### ARTICLE 1

#### GENERAL PROVISIONS

##### 1.1 BASIC DEFINITIONS

###### 1.1.1. The Contract Documents

In Section 1.1.1 delete the third sentence, and add the following sentence:

The Contract Documents shall include the Bid Documents as listed in the Instructions to Bidders and any modifications made thereto by addenda.

###### 1.1.8 Initial Decision Maker

Delete all after the words, "shall not show partiality to the Owner or Contractor".

##### 1.5 OWNERSHIP AND USE OF DRAWINGS, SPECIFICATIONS AND OTHER INSTRUMENTS OF SERVICE [REFER TO *La R.S. 38:2317*]

1.5.1 Delete the first sentence of the paragraph.

1.5.1 In the third sentence: delete the remainder after the word "publication".

##### 1.7 DIGITAL DATA USE AND TRANSMISSION

In the first sentence after the words, "in digital form" delete ". The parties will use AIA Document E203 2013, Building Information Modeling and Digital Data Exhibit".

##### 1.8 BUILDING INFORMATION MODELS USE AND RELIANCE

Delete Section 1.8.

### ARTICLE 2

#### OWNER

##### 2.2 EVIDENCE OF THE OWNER'S FINANCIAL ARRANGEMENTS

Delete Section 2.2.

##### 2.3 INFORMATION AND SERVICES REQUIRED OF THE OWNER

2.3.1 In the first sentence, delete: all before "the Owner shall secure..."

Delete Section 2.3.2 and substitute the following:

2.3.2 The term Architect, when used in the Contract Documents, shall mean the prime Designer (Architect, Engineer, or Landscape Architect), or his authorized representative, lawfully licensed to practice architecture, engineering, or landscape architecture in the State of Louisiana, identified as such in the Agreement and is referred to throughout the Contract Documents as if singular in number.

2.3.3 Delete the words: “to whom the Contractor has no reasonable objection and”.

### **ARTICLE 3**

#### **CONTRACTOR**

#### **3.4 LABOR AND MATERIALS**

3.4.2 Delete Section 3.4.2.

Delete Section 3.4.3 and substitute with the following:

3.4.3 Contractor and its employees, officers, agents, representatives, and Subcontractors shall conduct themselves in an appropriate and professional manner, in accordance with the Owner’s requirements, at all times while working on the Project. Any such individual who behaves in an inappropriate manner or who engages in the use of inappropriate language or conduct while on Owner’s property, as determined by the Owner, shall be removed from the Project at the Owner’s request. Such individual shall not be permitted to return without the written permission of the Owner. The Owner shall not be responsible or liable to Contractor or any Subcontractor for any additional costs, expenses, losses, claims or damages incurred by Contractor or its Subcontractor as a result of the removal of an individual from the Owner’s property pursuant to this Section. The Contractor shall not permit employment of unfit persons or persons not properly skilled in tasks assigned to them.

#### **3.5 WARRANTY**

3.5.2 Replace reference to “Section 9.8.4” with “Section 9.8.6”.

#### **3.7 PERMITS, FEES, NOTICES, AND COMPLIANCE WITH LAWS (La R.S. 40:1724[A])**

3.7.1 Delete Section 3.7.1.

3.7.2 In Section 3.7.2, replace the word “public” with the word “State”.

Delete Section 3.7.5 and substitute the following:

3.7.5 If, during the course of the Work, the Contractor discovers human remains, unmarked burial or archaeological sites, burial artifacts, or wetlands, which are not indicated in the Contract Documents, the Contractor shall follow all procedures mandated by State and Federal law, including but not limited to La R.S. 8:671 et seq., the Office of Coastal Protection and Restoration, and Sections 401 & 404 of the Federal Clean Water Act. Request for adjustment of the Contract Sum and Contract Time arising from the existence of such remains or features shall be submitted in writing to the Owner pursuant to the Contract Documents.

#### **3.8 ALLOWANCES**

Delete Sections 3.8.1, 3.8.2, and 3.8.3 in their entirety and add the following new Section 3.8.1:

3.8.1 Allowances shall not be made on any of the Work.

#### **3.9 SUPERINTENDENT**

3.9.1 Add the following to the end of the paragraph:  
Important communications shall be confirmed in writing. Other communications shall be similarly confirmed on written request in each case.

#### **3.10 CONTRACTOR’S CONSTRUCTION AND SUBMITTAL SCHEDULES**

3.10.1 Add the following: For Projects with a contract sum greater than \$1,000,000.00, the Contractor shall include with the schedule, for the Owner’s and Architect’s information, a network analysis to identify those



tasks which are on the critical path, i.e., where any delay in the completion of these tasks will lengthen the Project timescale, unless action is taken. A revised schedule shall be submitted with each Application and Certificate for Payment. No payment shall be made until this schedule is received.

3.10.3 In the first sentence, delete the word “general”.

After the first sentence, add the following:

If the Work is not on schedule, as determined by the Architect, and the Contractor fails to take action to bring the Work on schedule, then the Contractor shall be deemed in default under this Contract and the progress of the Work shall be deemed unsatisfactory. Such default may be considered grounds for termination by the Owner for cause in accordance with Section 14.2.

Add the following Sections:

3.10.4 Add the following: Submittal by the contractor of a schedule or other documentation showing a completion date for his Work prior to the completion date stated in the contract shall not impose any obligation or responsibility on the Owner or Architect for the earlier completion date.

3.10.5 In the event the Owner employs a commissioning consultant, the Contractor shall cooperate fully in the commissioning process and shall require all subcontractors and others under his control to cooperate. The purpose of such services shall be to ensure that all systems perform correctly and interactively according to the provisions of the Contract Documents.

### **3.11 DOCUMENTS AND SAMPLES AT THE SITE**

Add the following: This requirement is of the essence of the contract. The Architect shall determine the value of these documents and this amount shall not be approved for payment to the Contractor until all of the listed documents are delivered to the Architect in good order, completely marked with field changes and otherwise complete in all aspects.

## **ARTICLE 4 ARCHITECT**

### **4.2 ADMINISTRATION OF THE CONTRACT**

4.2.1 In the first sentence, delete the phrase: “the date the Architect issues the final Certificate for Payment” and replace with the phrase “final payment is due, and with the Owner’s concurrence, from time to time during the one year period for correction of Work described in Section 12.2.”

4.2.2 In the first sentence, after the phrase: “become generally familiar with”; insert the following: “and to keep the Owner informed about”.

In the first sentence, after the phrase “portion of the Work completed”, insert the following: “to endeavor to guard the Owner against defects and deficiencies in the Work,”

4.2.4 In the first sentence, delete all after “The Owner and Contractor”, and add the following “may communicate directly with each other, when deemed necessary by the Owner, and the Owner will notify the Architect of any decision.”

4.2.10 Add the following sentence to the end of Section 4.2.10: There shall be no restriction on the Owner having a Representative.

4.2.11 Add the following sentence to the end of Section 4.2.11:

If no agreement is made concerning the time within which interpretation required of the Architect shall be furnished in compliance with this Section 4.2, then delay shall not be recognized on account of failure by the Architect to furnish such interpretation until 15 days after written request is made for them.

4.2.14 Insert the following sentence between the second and third sentences of Section 4.2.14:

If no agreement is made concerning the time within which interpretation required of the Architect shall be furnished in compliance with this Section 4.2, then delay shall not be recognized on account of failure by the Architect to furnish such interpretation until 15 days after written request is made for them.

## **ARTICLE 5**

### **SUBCONTRACTORS**

#### **5.2 AWARD OF SUBCONTRACTS AND OTHER CONTRACTS FOR PORTIONS OF THE WORK**

Delete Section 5.2.1, and substitute the following:

5.2.1 Unless otherwise required by the Contract Documents, the Contractor shall furnish at the Pre-Construction Conference, to the Owner and the Architect, in writing, the names of the persons or entities (including those who are to furnish materials or equipment fabricated to a special design) proposed for each of the principal portions of the Work. No Contractor payments shall be made until this information is received.

Delete Section 5.2.2, and substitute the following:

5.2.2 The Contractor shall be solely responsible for selection and performance of all subcontractors. The Contractor shall not be entitled to claims for additional time and/or an increase in the contract sum due to a problem with performance or nonperformance of a subcontractor.

Delete Sections 5.2.3 and 5.2.4 and substitute the following:

5.2.3 The Contractor shall notify the Architect and the Owner when a subcontractor is to be changed and substituted with another subcontractor.

#### **5.4 CONTINGENT ASSIGNMENT OF SUBCONTRACTS**

Delete Sections 5.4, 5.4.1, 5.4.2 and 5.4.3

## **ARTICLE 7**

### **CHANGES IN THE WORK**

#### **7.1 GENERAL**

Add the following Sections:

7.1.4 As part of the pre-construction conference submittals, the Contractor shall submit the following prior to the Contractor's initial request for payment:

7.1.4.1 Fixed job site overhead cost itemized with documentation to support daily rates.

7.1.4.2 Bond Premium Rate with supporting information from the General Contractor's carrier.

7.1.4.3 Labor Burden by trade for both Subcontractors and General Contractor. The Labor Burden shall be supported by the Worker's Compensation and Employer's Liability Insurance Policy Information Page. Provide for all trades.

7.1.4.4 Internal Rate Charges for all significant company owned equipment.

7.1.5 If the General Contractor fails to submit the aforementioned documentation as part of the pre-construction submittals, then pay applications shall not be processed until such time as the Owner receives this information.

#### **7.2 CHANGE ORDERS**

Delete Section 7.2.1, and substitute the following Sections:

7.2.1 A Change Order is a written instrument prepared by the Architect and signed by the Owner, the Architect, and the Contractor issued after execution of the Contract, authorizing a change in the Work

and/or an adjustment in the Contract Sum and/or the Contract Time. The Contract Sum and the Contract Time may be changed only by Change Order. A Change Order signed by the Contractor indicates his agreement therewith, including the adjustment in the Contract Sum or the Contract Time. Any reservation of rights, stipulation, or other modification made on the change order by the contractor shall have no effect.

- 7.2.2 “Cost of the Work” for the purpose of Change Orders shall be the eligible costs required to be incurred in performance of the Work and paid by the Contractor and Subcontractors which eligible costs shall be limited to:

7.2.2.1 Actual wages paid directly to labor personnel, with a labor burden markup exclusively limited to applicable payroll taxes, worker’s compensation insurance, unemployment compensation, and social security taxes for those labor personnel performing the Work. Wages shall be the basic hourly labor rate paid an employee exclusive of fringe benefits or other employee costs. The labor burden percentage for the “Cost of the Work” is limited to categories listed herein. Employer-provided health insurance, fringe benefits, employee training (whether a requirement of employment or not), vacation pay, etc., are examples of ineligible labor burden costs which **shall not** be included, as these costs are already compensated by the Overhead and Profit markup.

Supervision shall not be included as a line item in the “Cost of the Work”, except when the change results in a documented delay in the critical path, as described in Section 7.2.7.

7.2.2.2 Cost of all materials and supplies necessary and required to perform the Work, identifying each item and its individual cost, including taxes. Incidental consumables are not eligible costs and shall not be included.

7.2.2.3 Cost of each necessary piece of machinery and equipment required to perform the Work, identifying each item and its individual cost, including taxes. Incidental small tools of a specific trade (i.e., shovels, saws, hammers, air compressors, etc.) and general use vehicles, such as pickup trucks even for moving items around the site, fuel for these general use vehicles, travel, lodging, and/or meals are not eligible and shall not be included.

7.2.2.4 Eligible Insurance costs shall be limited to documented increases in “Builder’s Risk” insurance premium / costs only. Commercial General Liability, Automobile Liability, and all other required insurances, where referenced in the Contract shall be considered part of normal overhead. These costs are already compensated by the Overhead and Profit markup.

7.2.2.5 Cost for the General Contractor Performance and Payment Bond premium, where the documented cost of the premiums have been increased due to the Change Order.

- 7.2.3 Overhead and Profit - The Contractor and Subcontractor shall be due home office fixed overhead and profits on the Cost of the Work, but shall not exceed a total of 16% of the direct cost of any portion of Work.

The credit to the Owner resulting from a change in the Work shall be the sum of those items above, except credit will not be required for Overhead and Profit. Where a change results in both credits to the Owner and extras to the Contractor for related items, overhead and profit shall only be computed on the net extra cost to the Contractor.

- 7.2.4 The cost to the Owner resulting from a change in the Work shall be the sum of: Cost of the Work (as defined at Section 7.2.2) and Overhead and Profit (as defined at Section 7.2.3), and shall be computed as follows:

7.2.4.1 When all of the Work is General Contractor Work; 8% markup on the Cost of the Work.

7.2.4.2 When the Work is all Subcontract Work; 8% markup on the Cost of the Work for Subcontractor's Overhead and Profit, plus 8% markup on the Cost of the Work, not including the Subcontractor's Overhead and Profit markup, for General Contractor's Overhead and Profit.

7.2.4.3 When the Work is a combination of General Contractor Work and Subcontract Work; that portion of the direct cost that is General Contract Work shall be computed per Section 7.2.4.1 and that portion of the direct cost that is Subcontract Work shall be computed per Section 7.2.4.2.

Premiums for the General Contractor's bond may be included, but after the markup is added to the Cost of the Work.

Premiums for the Subcontractor's Bond shall not be included.

7.2.4.4 Subcontract cost shall consist of the items in Section 7.2.2 above plus Overhead and Profit as defined in Section 7.2.3.

7.2.5 Before a Change Order is prepared, the Contractor shall prepare and deliver to the Architect the following information concerning the Cost of the Work, not subject to waiver, within a reasonable time after being notified to prepare said Change Order:

A detailed, itemized list of labor, material and equipment costs for the General Contractor's Work including quantities and unit costs for each item of labor, material and equipment.

An itemized list of labor, material and equipment costs for each Subcontractor's and/or Sub-Subcontractor's Work including quantities and unit costs for each item of labor, material and equipment.

7.2.6 After a Change Order has been approved, no future requests for extensions of time or additional cost shall be considered for that Change Order.

7.2.7 Extended fixed job-site costs are indirect costs that are necessary to support the work in the field. Examples of fixed job-site costs are field office rental, salaries of field office staff, field office utilities and telephone.

Extended fixed job-site costs or equitable adjustment, may be included in a Change Order due to a delay in the critical path, with the exception of weather related delays. In the event of a delay in the critical path, the Contractor shall submit all changes or adjustments to the Contract Time **within twenty-one (21) days** of the event giving rise to the delay. The Contractor shall submit documentation and justification for the adjustment by performing a critical path analysis of its most recent schedule in use prior to the change, which shows an extension in critical path activities.

The Contractor shall notify the Architect in writing that the Contractor is making a claim for extended fixed job-site overhead as required by Section 15.1.2. The Contractor shall provide proof that the Contractor is unable to mitigate financial damages through Alternate Work within this Contract or replacement work. "Replacement Work" is that work which the Contractor is obligated to perform under any construction contract separate from this Contract. Reasonable proof shall be required by the Architect that the delays affected the Completion Date.

7.2.8 "Cost of the Work" whether General Contractor cost or Subcontractor cost shall not apply to the following:

7.2.8.1 Salaries or other compensation of the Contractor's personnel at the Contractor's principal office and branch offices.

7.2.8.2 Any part of the Contractor's capital expenses, including interest on the Contractor's capital employed for the Work.

7.2.8.3 Overhead and general expenses of any kind or the cost of any item not specifically and expressly included above in Cost of the Work.

7.2.8.4 Cost of supervision, refer to section 7.2.2.1, with exception as provided in Section 7.2.7.

7.2.9 When applicable as provided by the Contract, the cost to Owner for Change Orders shall be determined by quantities and unit prices. The quantity of any item shall be as submitted by the Contractor and approved by the Architect. Unit prices shall cover cost of Material, Labor, Equipment, Overhead and Profit.

### **7.3 CONSTRUCTION CHANGE DIRECTIVES**

7.3.3 In the first sentence after “following methods” insert: “, but not to exceed a specified amount”.

7.3.4 From .1 of the list, delete all after “Costs of labor, including” and substitute the following “social security, old age and employment insurance, applicable payroll taxes, and workers’ compensation insurance;”

Delete the following from .4 of the list: “permit fees,”

Delete Section 7.3.9 and substitute the following:

7.3.9 Pending final determination of the total costs of a Construction Change Directive to the Owner, amounts not in dispute for such changes in the Work shall be included in Applications for Payment accompanied by a Change Order indicating the parties’ agreement with part or all of such costs.

## **ARTICLE 8**

### **TIME**

#### **8.1 DEFINITIONS**

Add the following:

8.1.5 The Contract Time shall not be changed by the submission of a schedule that shows an early completion date unless specifically authorized by change order.

#### **8.2 PROGRESS AND COMPLETION**

Add to Section 8.2.1 the following:

Completion of the Work must be within the Time for Completion stated in the Agreement, subject to such extensions as may be granted under Section 8.3. The Contractor agrees to commence Work not later than fourteen (14) days after the transmittal date of Written Notice to Proceed from the Owner and to substantially complete the Project within the time stated in the Contract. The Owner will suffer financial loss if the Project is not substantially complete in the time set forth in the Contract Documents. The Contractor and the Contractor’s Surety shall be liable for and shall pay to the Owner the sum stated in the Contract Documents as fixed, agreed and liquidated damages for each consecutive calendar day (Saturdays, Sundays and holidays included) of delay until the Work is substantially complete. The Owner shall be entitled to the sum stated in the Contract Documents. Such Liquidated Damages shall be withheld by the Owner from the amounts due the Contractor for progress payments.

Delete Section 8.2.2.

#### **8.3 DELAYS AND EXTENSIONS OF TIME**

8.3.1 In the first sentence after the words “Owner pending” delete the words “mediation and binding dispute resolution” and add the word “litigation”, and delete the last word “determine” and add the following: “recommend, subject to Owner’s approval of Change Order. If the claim is not made within the limits of Article 15, all rights for future claims for that month are waived.”

**ARTICLE 9****PAYMENTS AND COMPLETION****9.1 CONTRACT SUM**

Delete Section 9.1.2.

Delete Section 9.2 and substitute the following:

**9.2 SCHEDULE OF VALUES**

At the Pre-Construction Conference, the Contractor shall submit to the Owner and the Architect a Schedule of Values prepared as follows:

- 9.2.1 The attached Schedule of Values Format shall be used. If applicable, the cost of Work for each section listed under each division, shall be given. The cost for each section shall include Labor, Materials, Overhead and Profit.
- 9.2.2 The Total of all items shall equal the Total Contract Sum. This schedule, when approved by the Architect, shall be used as a basis for the Contractor's Applications for Payment and it may be used for determining the cost of the Work in deductive change orders, when a specific item of Work listed on the Schedule of Values is to be removed. Once the Schedule of Values is submitted at the Pre-Construction Conference, the schedule shall not be modified without approval from the Owner and Architect.

**9.3 APPLICATIONS FOR PAYMENT**

Delete Sections 9.3.1, 9.3.1.1, and 9.3.1.2 and substitute the following:

9.3.1 Monthly, the Contractor shall submit to the Architect an Application & Certificate for Payment on the AIA Document G702-1992, accompanied by AIA Document G703-1992, and supported by any additional data substantiating the Contractor's right to payment as the Owner or the Architect may require. Application for Payment shall be submitted on or about the first of each month for the value of labor and materials incorporated into the Work and of materials, suitably stored, at the site as of the twenty-fifth day of the preceding month, less normal retainage as follows, per La R.S. 38:2248:

9.3.1.1 Projects with Contract price up to \$500,000.00 – 10% of the Contract price.

9.3.1.2 Projects with Contract price of \$500,000.00, or more – 5% of the Contract price.

9.3.1.3 No payment shall be made until the revised schedule required by Section 3.10.1 is received.

9.3.1.4 The normal retainage shall not be due the Contractor until after substantial completion and expiration of the forty-five day lien period and submission to the Architect of a clear lien certificate, consent of surety, and invoice for retainage.

Delete Section 9.3.2 and substitute the following:

9.3.2 Unless otherwise provided in the Contract Documents, payments shall be made on account of materials and equipment delivered and suitably stored at the site for subsequent incorporation in the Work. Payments for materials or equipment stored on the site shall be conditioned upon submission by the Contractor of bills of sale or such other procedures satisfactory to the Owner to establish the Owner's title to such materials and equipment or otherwise protect the Owner's interest, including applicable insurance.

**9.5 DECISIONS TO WITHHOLD CERTIFICATION**

Section 9.5.1.7: Delete the word "repeated".

Delete Section 9.5.4.

**9.6 PROGRESS PAYMENTS**

Delete Section 9.6.1 and substitute the following:

9.6.1 After the Architect has issued a Certificate for Payment, the Owner shall make payment

within twenty days except for Projects funded fully or in part by a Federal reimbursement program. For such Projects the Owner will make payment in a timely manner consistent with reimbursement.

9.6.2 Delete the phrase: “no later than seven days” from the first sentence.

After the end of the second sentence, add the following:

La R.S. 9:2784 (A) and (C) require a Contractor or Subcontractor to make payment due to each Subcontractor and supplier within fourteen (14) consecutive days of the receipt of payment from the Owner. If not paid, a penalty in the amount of  $\frac{1}{2}$  of 1% per day is due, up to a maximum of 15% from the expiration date until paid. The contractor or subcontractor, whichever is applicable, is solely responsible for payment of a penalty.

9.6.4 Delete the first two sentences of Section 9.6.4 and add the following to the end of the Section:

Pursuant to La. R.S. 38:2242 and La. R.S. 38:2242.2, when the Owner receives any claim of nonpayment arising out of the Contract, the Owner shall deduct 125% of such claim from the Contract Sum. The Contractor, or any interested party, may deposit security, in accordance with La. R.S. 38:2242.2, guaranteeing payment of the claim with the recorder of mortgages of the parish where the Work has been done. When the Owner receives original proof of such guarantee from the recorder of mortgages, the claim deduction will be added back to the Contract Sum.

Delete Section **9.7 FAILURE OF PAYMENT**.

Delete Section 9.8 and substitute the following:

## **9.8 SUBSTANTIAL COMPLETION**

9.8.1 Substantial Completion is the stage in the progress of the Work when the Work is sufficiently complete in accordance with the Contract Documents so that the Owner can occupy or utilize the Work for its intended use. The Architect shall determine if the Project is substantially complete in accordance with this Section.

9.8.2 When the Contractor considers that the Work is Substantially Complete, the Contractor shall prepare and submit to the Architect a comprehensive list of items to be completed or corrected prior to final payment. Failure to include an item on such list does not alter the responsibility of the Contractor to complete all Work in accordance with the Contract Documents.

9.8.3 Upon receipt of the Contractor’s list, the Architect shall make an inspection to determine whether the Work is substantially complete. A prerequisite to the Work being considered as substantially complete is the Owner’s receipt of the executed Roofing Contractor’s and Roofing Manufacturer’s guarantees, where roofing Work is part of the Contract. Prior to inspection by the Architect, the Contractor shall notify the Architect that the Project is ready for inspection by the State Fire Marshal’s office. If the Architect’s inspection discloses any item, whether or not included on the Contractor’s list, which is not sufficiently complete in accordance with the Contract Documents so that the Owner can occupy or utilize the Work for its intended use, the Contractor shall, before the Work can be considered as Substantially Complete, complete or correct such item upon notification by the Architect. In such case, the Contractor shall then submit a request for another inspection by the Architect to determine Substantial Completion.

9.8.4 When the Architect determines that the Project is Substantially Complete, he shall prepare a punch list of exceptions and the dollar value related thereto. The monetary value assigned to this list will be the sum of the cost estimate for each particular item of Work the Architect develops based on the mobilization, labor, material and equipment costs of correcting the item and shall be retained from the

monies owed the contractor, above and beyond the standard lien retainage. The cost of these items shall be prepared in the same format as the schedule of values. At the end of the forty-five day lien period payment shall be approved for all punch list items completed up to that time. After that payment, none of the remaining funds shall be due the contractor until all punch list items are completed and are accepted by the Architect. If the dollar value of the punch list exceeds the amount of funds, less the retainage amount, in the remaining balance of the Contract, then the Project shall not be considered as substantially complete. If funds remaining are less than that required to complete the Work, the Contractor shall pay the difference.

9.8.5 When the preparation of the punch list is complete the Architect shall prepare a Recommendation of Acceptance incorporating the punch list and submit it to the Owner. Upon approval of the Recommendation of Acceptance, the Owner may issue a Notice of Acceptance of Building Contract which shall establish the Date of Substantial Completion. The Contractor shall record the Notice of Acceptance with the Clerk of Court in the Parish in which the Work has been performed. If the Notice of Acceptance has not been recorded seven (7) days after issuance, the Owner may record the Acceptance at the Contractor's expense. All additive change orders must be processed before issuance of the Recommendation of Acceptance. The Owner shall not be responsible for payment for any Work associated with change orders that is not incorporated into the contract at the time of the Recommendation of Acceptance.

9.8.6 Warranties required by the Contract Documents shall commence on the date of Acceptance of the Work unless otherwise agreed to in writing by the Owner and Contractor. Unless otherwise agreed to in writing by the Owner and Contractor, security, maintenance, heat, utilities, damage to the Work not covered by the punch list and insurance shall become the Owner's responsibility on the Date of Substantial Completion.

9.8.7 If all punch list items have not been completed by the end of the forty-five (45) day lien period, through no fault of the Architect or Owner, the Owner may hold the Contractor in default. If the Owner finds the Contractor is in default, the Surety shall be notified. If within forty-five (45) days after notification, the Surety has not completed the punch list, through no fault of the Architect or Owner, the Owner may, at his option, contract to have the balance of the Work completed and pay for such Work with the unpaid funds remaining in the Contract sum. Finding the Contractor in default shall constitute a reason for disqualification of the Contractor from bidding on future state contracts. If the surety fails to complete the punch list within the stipulated time period, the Owner may not accept bonds submitted, in the future, by the surety.

## **9.9 PARTIAL OCCUPANCY OR USE**

Delete Section 9.9.1 and substitute the following:

9.9.1 Partial Occupancy is that stage in the progress of the Work when a designated portion of the Work is sufficiently complete in accordance with the Contract Documents so the Owner can occupy or utilize the designated portion of the Work for its intended use. The Owner may occupy or use any substantially completed portion of the Work so designated by separate agreement with the Contractor and authorized by public authorities having jurisdiction over the Work. Such occupancy or use may commence provided the Owner and Contractor have accepted in writing the responsibilities assigned to each of them for payments, if any, security, maintenance, heat, utilities, damage to the Work and insurance, and have agreed in writing concerning the period for correction of the Work and commencement of warranties required by the Contract Documents. When the Contractor considers the designated portion substantially complete the Contractor shall prepare and submit a list to the Architect as provided under Section 9.8.2. Consent of the Contractor to partial occupancy or use shall not be unreasonably withheld.

## **9.10 FINAL COMPLETION AND FINAL PAYMENT**



9.10.1 After the second sentence, add the following:

If the Architect does not find the Work acceptable under the Contract Documents, the Architect shall make one additional inspection; if the Work is still not acceptable, the Architect, and each of the Architect's principal consultants, shall be paid \$175.00/hour for their time at the Project site, for each additional inspection, to be withheld from the unpaid funds remaining in the Contract sum. The payment shall be made by the Owner and deducted from the construction contract funds.

Delete Section 9.10.4 and replace with the following:

9.10.4 The making of final payment shall not constitute a waiver of Claims by the Owner for the following:

9.10.4.1 Claims, security interests, or encumbrances arising out of the Contract and unsettled;

9.10.4.2 failure of the Work to comply with the requirements of the Contract Documents irrespective of when such failure is discovered;

9.10.4.3 terms of special warranties required by the Contract Documents; or

9.10.4.4 audits performed by the Owner, after final payment.

## **ARTICLE 10**

### **PROTECTION OF PERSONS AND PROPERTY**

#### **10.2 SAFETY OF PERSONS AND PROPERTY**

10.2.2 In the first sentence, between the words: "bearing on" and "safety", add the words: "the health and,"

#### **10.3 HAZARDOUS MATERIALS**

10.3.1 In the second sentence after (PCB) add: "or lead".

10.3.2 After the first sentence, delete all remaining sentences.

Add at the end: "The Contract time shall be extended appropriately."

Delete Section 10.4 and substitute the following:

#### **10.4 EMERGENCIES**

In an emergency affecting the safety of persons or property, the Contractor shall notify the Owner and Architect immediately of the emergency, simultaneously acting at his discretion to prevent damage, injury or loss. Any additional compensation or extension of time claimed by the Contractor on account of emergency Work shall be determined as provided in Article 15 and Article 7.

## **ARTICLE 11**

### **INSURANCE AND BONDS**

**AIA A101 – 2017 Exhibit A is not a part of these documents. Delete all of Sections 11.1, 11.2, 11.3, 11.4, and 11.5, and substitute the following:**

### **INSURANCE REQUIREMENTS FOR NEW CONSTRUCTION, ADDITIONS AND RENOVATIONS**

#### **11.1 CONTRACTOR'S LIABILITY INSURANCE**

The Contractor shall purchase and maintain without interruption for the duration of the contract insurance against claims for injuries to persons or damages to property which may arise from or in connection with the performance of the Work hereunder by the Contractor, its agents, representatives, employees or

subcontractors. The duration of the contract shall be from the inception of the contract until the date of final payment.

## **11.2 MINIMUM SCOPE AND LIMITS OF INSURANCE**

### **11.2.1 Worker's Compensation**

Worker's Compensation insurance shall be in compliance with the Worker's Compensation law of the Contractor's headquarters. Employers Liability is included with a minimum limit of \$1,000,000 per accident/per disease/per employee. If Work is to be performed over water and involves maritime exposure, applicable LHWCA, Jones Act or other maritime law coverage shall be included. A.M. Best's insurance company rating requirement may be waived for Worker's compensation coverage only.

### **11.2.2 Commercial General Liability**

Commercial General Liability insurance, including Personal and Advertising Injury Liability and Products and Completed Operations Liability, shall have a minimum limit per occurrence based on the Project value. The Insurance Services Office (ISO) Commercial General Liability occurrence coverage form CG 00 01 (current form approved for use in Louisiana), or equivalent, is to be used in the policy. Claims-made form is unacceptable.

The aggregate loss limit must apply to each Project. ISO form CG 25 03 (current form approved for use in Louisiana), or equivalent, shall also be submitted. The State Project number, including part number, and Project name shall be included on this endorsement.

### **COMBINED SINGLE LIMIT (CSL) PER OCCURRENCE**

<b>Type of Construction</b>	<b>Projects up to \$1,000,000</b>	<b>Projects over \$1,000,000 up to \$50,000,000</b>	<b>Projects over \$50,000,000</b>
<b>New Buildings:</b>			
Each Occurrence			
Minimum Limit	\$1,000,000	\$2,000,000	\$4,000,000
Per Project Aggregate	\$2,000,000	\$4,000,000	\$8,000,000
<b>Renovations:</b>	<b>The building(s) value for the Project is \$_____.</b>		
Each Occurrence			
Minimum Limit	\$1,000,000**	\$2,000,000**	\$4,000,000**
Per Project Aggregate	2 times per occur limit**	2 times per occur limit**	2 times per occur limit**

\*\*While the minimum Combined Single Limit of \$1,000,000 is required for any renovation, the limit is calculated by taking 10% of the building value and rounding it to the nearest \$1,000,000 to get the insurance limit. Example: Renovation on a \$33,000,000 building would have a calculated \$3,000,000 combined single limit of coverage (33,000,000 times .10 = 3,300,000 and then rounding down to \$3,000,000). If the calculated limit is less than the minimum limit listed in the above chart, then the amount needed is the minimum listed in the chart. Maximum per occurrence limit required is \$50,000,000 regardless of building value. The per Project aggregate limit is then calculated as twice the per occurrence limit.

### **11.2.3 Automobile Liability**

Automobile Liability Insurance shall have a minimum combined single limit per occurrence of \$1,000,000. ISO form number CA 00 01 (current form approved for use in Louisiana), or equivalent, is to be used in the policy. This insurance shall include third-party bodily injury and property damage liability for owned, hired and non-owned Automobiles.

#### 11.2.4 Excess Umbrella

Excess Umbrella Insurance may be used to meet the minimum requirements for General Liability and Automobile Liability only.

#### 11.2.5 Builder's Risk

11.2.5.1 Builder's Risk Insurance shall be in an amount equal to the amount of the construction contract including any amendments and shall be upon the entire Work included in the contract. The policy shall provide coverage equivalent to the ISO form number CP 10 20, Broad Form Causes of Loss (extended, if necessary, to include the perils of wind, earthquake, collapse, vandalism/malicious mischief, and theft, including theft of materials whether or not attached to any structure). The policy must include architects' and engineers' fees necessary to provide plans, specifications and supervision of Work for the repair and/or replacement of property damage caused by a covered peril, not to exceed 10% of the cost of the repair and/or replacement.

11.2.5.2 Flood coverage shall be provided by the Contractor on the first floor and below for all Projects, except as otherwise noted. The builder's risk insurance policy, sub-limit for flood coverage shall not be less than ten percent (10%) of the total contract cost per occurrence. If flood is purchased as a separate policy, the limit shall be ten percent (10%) of the total contract cost per occurrence (with a max of \$500,000 if NFIP). Coverage for roofing Projects shall **not** require flood coverage.

11.2.5.3 A Specialty Contractor may provide an installation floater in lieu of a Builder's Risk policy, with the similar coverage as the Builder's Risk policy, upon the system to be installed in an amount equal to the amount of the contract including any amendments. Flood coverage is not required.

11.2.5.4 The policy must include coverage for the Owner, Contractor and any subcontractors as their interests may appear.

#### 11.2.6 Pollution Liability (*required when asbestos or other hazardous material abatement is included in the contract*)

Pollution Liability insurance, including gradual release as well as sudden and accidental, shall have a minimum limit of not less than \$1,000,000 per claim. A claims-made form will be acceptable. A policy period inception date of no later than the first day of anticipated Work under this contract and an expiration date of no earlier than 30 days after anticipated completion of all Work under the contract shall be provided. There shall be an extended reporting period of at least 24 months, with full reinstatement of limits, from the expiration date of the policy if the policy is not renewed. The policy shall not be cancelled for any reason, except non-payment of premium.

#### 11.2.7 Deductibles and Self-Insured Retentions

Any deductibles or self-insured retentions must be declared to and accepted by the Owner. The Contractor shall be responsible for all deductibles and self-insured retentions.

### 11.3 OTHER INSURANCE PROVISIONS

#### 11.3.1 The policies are to contain, or be endorsed to contain, the following provisions:

##### 11.3.1.1 Worker's Compensation and Employers Liability Coverage

11.3.1.1.1 To the fullest allowed by law, the insurer shall agree to waive all rights of subrogation against the Owner, its officers, agents, employees and volunteers for losses arising from Work performed by the Contractor for the Owner.

##### 11.3.1.2 Commercial General Liability Coverage

11.3.1.2.1 The Owner, its officers, agents, employees and volunteers are to be added as additional insureds as respects liability arising out of activities performed by or on

behalf of the Contractor; products and completed operations of the Contractor, premises owned, occupied or used by the Contractor. ISO Form CG 20 10 (for ongoing work) AND CG 20 37 (for completed work) (current forms approved for use in Louisiana), or equivalent, are to be used.

11.3.1.2.2 The Contractor's insurance shall be primary as respects the Owner, its officers, agents, employees and volunteers for any and all losses that occur under the contract. The coverage shall contain no special limitations on the scope of protection afforded to the Owner, its officers, officials, employees or volunteers. Any insurance or self-insurance maintained by the Owner shall be excess and non-contributory of the Contractor's insurance.

#### 11.3.1.3 Builder's Risk

The policy must include an endorsement providing the following:

In the event of a disagreement regarding a loss covered by this policy, which may also be covered by a State of Louisiana self-insurance or commercial property policy through the Office of Risk Management (ORM), Contractor and its insurer agree to follow the following procedure to establish coverage and/or the amount of loss:

Any party to a loss may make written demand for an appraisal of the matter in disagreement. Within 20 days of receipt of written demand, the Contractor's insurer and either ORM or its commercial insurance company shall each select a competent and impartial appraiser and notify the other of the appraiser selected. The two appraisers shall select a competent and impartial umpire. The appraisers shall then identify the policy or policies under which the loss is insured and, if necessary, state separately the value of the property and the amount of the loss that must be borne by each policy. If the two appraisers fail to agree, they shall submit their differences to the umpire. A written decision by any two shall determine the policy or policies and the amount of the loss. Each insurance company agrees that the decision of the appraisers and the umpire if involved shall be binding and final and that neither party will resort to litigation. Each of the two parties shall pay its chosen appraiser and bear the cost of the umpire equally.

#### 11.3.1.4 All Coverages

11.3.1.4.1 All policies must be endorsed to require 30 days written notice of cancellation to the Agency. Ten-day written notice of cancellation is acceptable for non-payment of premium. Notifications shall comply with the standard cancellation provisions in the Contractor's policy. In addition, Contractor is required to notify Agency of policy cancellations or reductions in limits.

11.3.1.4.2 Neither the acceptance of the completed Work nor the payment thereof shall release the Contractor from the obligations of the insurance requirements or indemnification agreement.

11.3.1.4.3 The insurance companies issuing the policies shall have no recourse against the Owner for payment of premiums or for assessments under any form of the policies.

11.3.1.4.4 Any failure of the Contractor to comply with reporting provisions of the policy shall not affect coverage provided to the Owner, its officers, agents, employees and volunteers.

#### 11.3.2 Acceptability of Insurers

All required insurance shall be provided by a company or companies lawfully authorized to do business in the jurisdiction in which the Project is located. Insurance shall be placed with insurers with an A.M. Best's rating of **A-: VI or higher**. This rating requirement may be waived for Worker's

compensation coverage only.

If at any time an insurer issuing any such policy does not meet the minimum A.M. Best rating, the Contractor shall obtain a policy with an insurer that meets the A.M. Best rating and shall submit another certificate of insurance within 30 days.

#### 11.3.3 Verification of Coverage

Contractor shall furnish the Owner with Certificates of Insurance reflecting proof of required coverage. The Certificates for each insurance policy are to be signed by a person authorized by that insurer to bind coverage on its behalf. The Certificates are to be received and approved by the Owner before Work commences and upon any contract renewal or insurance policy renewal thereafter. The Certificate Holder must be listed as follows:

State of Louisiana  
University of Louisiana at Lafayette  
PO Box 40197  
Lafayette, LA 70504  
Ref: Solicitation File No. \_\_\_\_\_

The Owner reserves the right to request complete certified copies of all required insurance policies at any time.

Upon failure of the Contractor to furnish, deliver and maintain required insurance, this contract, at the election of the Agency, may be suspended, discontinued, or terminated. Failure of the Contractor to purchase and/or maintain any required insurance shall not relieve the Contractor from any liability or indemnification under the contract.

If the Contractor does not meet the insurance requirements at policy renewal, at the option of the Owner, payment to the Contractor may be withheld until the requirements have been met, OR the Owner may pay the renewal premium and withhold such payment from any monies due the Contractor, OR the contract may be suspended or terminated for cause.

#### 11.3.4 Subcontractors

Contractor shall include all subcontractors as insureds under its policies OR shall be responsible for verifying and maintaining the certificates provided by each subcontractor. Subcontractors shall be subject to all of the requirements stated herein. The Owner reserves the right to request copies of subcontractor's certificates at any time.

If Contractor does not verify subcontractors' insurance as described above, Owner has the right to withhold payments to the Contractor until the requirements have been met.

#### 11.3.5 Worker's Compensation Indemnity

In the event Contractor is not required to provide or elects not to provide Worker's compensation coverage, the parties hereby agree the Contractor, its Owners, agents and employees shall have no cause of action against, and shall not assert a claim against, the state of Louisiana, its departments, agencies, agents and employees as an employer, whether pursuant to the Louisiana Worker's Compensation Act or otherwise, under any circumstance. The parties also hereby agree that the State of Louisiana, its departments, agencies, agents and employees shall in no circumstance be, or considered as, the employer or statutory employer of Contractor, its Owners, agents and employees. The parties further agree that Contractor is a wholly independent Contractor and is exclusively responsible for its employees, Owners, and agents. Contractor hereby agrees to protect, defend, indemnify and hold the State of Louisiana, its departments, agencies, agents and employees harmless from any such assertion or claim that may arise from the performance of this contract.

**11.3.6 Indemnification/Hold Harmless Agreement**

Contractor agrees to protect, defend, indemnify, save, and hold harmless, the State of Louisiana, all State Departments, Agencies, Boards and Commissions, its officers, agents, servants, employees and volunteers, from and against any and all claims, damages, expenses and liability arising out of injury or death to any person or the damage, loss or destruction of any property which may occur, or in any way grow out of, any act or omission of Contractor, its agents, servants and employees, or any and all costs, expenses and/or attorney fees incurred by Contractor as a result of any claims, demands, suits or causes of action, except those claims, demands, suits or causes of action arising out of the negligence of the State of Louisiana, all State Departments, Agencies, Boards, Commissions, its officers, agents, servants, employees and volunteers.

Contractor agrees to investigate, handle, respond to, provide defense for and defend any such claims, demands, suits or causes of action at its sole expense and agrees to bear all other costs and expenses related thereto, even if the claims, demands, suits, or causes of action are groundless, false or fraudulent. The State of Louisiana may, but is not required to, consult with the Contractor in the defense of claims, but this shall not affect the Contractor's responsibility for the handling and expenses of all claims.

**11.4 PERFORMANCE AND PAYMENT BOND**

11.4.1 The Owner shall have the right to require the Contractor to furnish bonds covering faithful performance of the Contract and payment of obligations arising thereunder as stipulated in bidding requirements or specifically required in the Contract Documents on the date of execution of the Contract.

11.4.2 Upon the request of any person or entity appearing to be a potential beneficiary of bonds covering payment of obligations arising under the Contract, the Contractor shall promptly furnish a copy of the bonds or shall authorize a copy to be furnished.

11.4.3 Recordation of Contract and Bond [La R.S. 38:2241 thru 38:2241.1]

The Owner shall require the Contractor to record within thirty (30) days the Contract Between Owner and Contractor and Performance and Payment Bond with the Clerk of Court in the Parish in which the Work is to be performed.

**ARTICLE 12****UNCOVERING AND CORRECTION OF WORK****12.2 CORRECTION OF WORK****12.2.1 Before Substantial Completion**

At the end of the paragraph, add the following sentences:

"If the Contractor fails to correct Work identified as defective within a thirty (30) day period, through no fault of the Designer, the Owner may hold the Contractor in default. If the Owner finds the Contractor in default, the Surety shall be notified. If within thirty (30) days after notification, the Surety has not corrected the nonconforming Work, through no fault of the Architect or Owner, the Owner may contract to have nonconforming Work corrected and hold the Surety and Contractor responsible for the cost, including architectural fees and other indirect costs. If the Surety fails to correct the Work within the stipulated time period and fails to meet its obligation to pay the costs, the Owner may elect not to accept bonds submitted in the future by the Surety. Finding the Contractor in default shall constitute a reason for disqualification of the Contractor from bidding on future state contracts.

**12.2.2 After Substantial Completion**

12.2.2.1 At the end of the paragraph delete the last sentence and add the following sentences:

"If the Contractor fails to correct nonconforming Work, or Work covered by warranties, within a thirty

(30) day period, through no fault of the Architect or Owner, the Owner may hold the Contractor in default. If the Owner finds the Contractor is in default, the Surety shall be notified. If within thirty (30) days after notification, the Surety has not corrected the non-conforming or warranty Work, through no fault of the Architect or Owner, the Owner may contract to have the nonconforming or warranty Work corrected and hold the Surety responsible for the cost including architects fees and other indirect costs. Corrections by the Owner shall be in accordance with Section 2.4. If the Surety fails to correct the nonconforming or warranty Work within the stipulated time period and fails to meet its obligation to pay the costs, the Owner may not accept bonds submitted, in the future, by the Surety."

## **ARTICLE 13**

### **MISCELLANEOUS PROVISIONS**

#### **13.1 GOVERNING LAW**

Delete all after the word "located".

#### **13.2 SUCCESSORS AND ASSIGNS**

13.2.1 In the second sentence, delete "Except as ... 13.2.2"

Delete Section 13.2.2.

#### **13.3 RIGHTS AND REMEDIES**

Add the following Section 13.3.3:

13.3.3 The Nineteenth Judicial Court in and for the Parish of East Baton Rouge, State of Louisiana shall have sole jurisdiction and venue in any action brought under this contract.

#### **13.4 TESTS AND INSPECTIONS**

In Section 13.4.1, delete the second sentence and substitute the following:

The Contractor shall make arrangements for such tests, inspections and approvals with the Testing Laboratory provided by the Owner, and the Owner shall bear all related costs of tests, inspections and approvals.

Delete the last two sentences of Section 13.4.1.

#### **13.5 INTEREST**

Delete Section 13.5.

## **ARTICLE 14**

### **TERMINATION OR SUSPENSION OF THE CONTRACT**

#### **14.1 TERMINATION BY THE CONTRACTOR**

Delete Section 14.1.1.4.

In Section 14.1.3, after the word "profit," delete the words "on Work not executed" and substitute the following: "for Work completed prior to stoppage".

#### **14.2 TERMINATION BY THE OWNER FOR CAUSE**

Add the following Section:

14.2.1.5 failure to complete the punch list within the lien period as provided in 9.8.7.

14.2.3 Add the following sentence:

"Termination by the Owner shall not suspend assessment of liquidated damages against the Surety."

Add the following Section:

14.2.5 If an agreed sum of liquidated damages has been established, termination by the Owner under this Article shall not relieve the Contractor and/or Surety of his obligations under the liquidated damages provisions and the Contractor and/or Surety shall be liable to the Owner for per diem liquidated

damages.

#### **14.4 TERMINATION BY THE OWNER FOR CONVENIENCE**

In Section 14.4.3, delete all after “incurred by reason of the termination,” and add “along with reasonable profit on the Work not executed.”

### **ARTICLE 15 CLAIMS AND DISPUTES**

#### **15.1 CLAIMS**

Delete Section 15.1.2, **Time Limit on Claims**, (See La R.S. 38:2189, and 38:2189.1).

15.1.3.1 Add the following to the end of the paragraph:

“A Reservation of Rights and similar stipulations shall not be recognized under this contract as having any effect. A party must make a claim as defined herein within the time limits provided.”

15.1.4.2 In the first sentence of the Section, delete “Initial Decision Maker’s” and replace with “Architect’s”. In the second sentence of the Section, delete “the decision of the Initial Decision Maker” and replace with: “his/her decision”.

Delete Section 15.1.6.2 and substitute the following:

15.1.6.2 If adverse weather conditions are the basis for a claim for additional time, the Contractor shall document that weather conditions had an adverse effect on the scheduled construction. An increase in the contract time due to weather shall not be cause for an increase in the contract sum. At the end of each month, the Contractor shall make one Claim for any adverse weather days occurring within the month. The Claim must be accompanied by sufficient documentation evidencing the adverse days and the impact on construction. Failure to make such Claim within **twenty-one (21) days** from the last day of the month shall prohibit any future claims for adverse days for that month. No additional adverse weather days shall be granted after the original or extended contract completion date, except those adverse weather days associated with a National Weather Service named storm or federally declared weather related disaster directly affecting the Project site.

Add the following Section:

15.1.6.3 The following are considered reasonably anticipated days of adverse weather on a monthly basis:

January	<u>11</u> days	July	<u>6</u> days
February	<u>10</u> days	August	<u>5</u> days
March	<u>8</u> days	September	<u>4</u> days
April	<u>7</u> days	October	<u>3</u> days
May	<u>5</u> days	November	<u>5</u> days
June	<u>6</u> days	December	<u>8</u> days

The Contractor shall ask for total adverse weather days. The Contractor’s request shall be considered only for days over the allowable number of days stated above.

*Note: Contract is on a calendar day basis.*

#### **15.2 INITIAL DECISION**

15.2.1 In the second sentence, delete the word “will” and replace with: “shall always”.

In the second sentence, delete the phrase: “, unless otherwise indicated in the Agreement.”

In the third sentence, delete the word “mediation” and replace with: “litigation”.

At the end of the third sentence, add: “arising prior to the date final payment is due”.

Delete the fourth sentence.

15.2.5 In the middle of the first sentence, delete all after the phrase: “rejecting the Claim”.



In the second sentence, delete the phrase: “and the Architect, if the Architect is not serving as the Initial Decision Maker,”.

In the third sentence, delete all after: “binding on the parties” and add the following: “except that the Owner may reject the decision or suggest a compromise or both”.

Delete Section 15.2.6.

Delete Section 15.2.6.1.

**15.3 MEDIATION**

Delete Section 15.3.

**15.4 ARBITRATION**

Delete Section 15.4.

**END OF SECTION**

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**INSURANCE REQUIREMENTS** *Revised February 2019**(for contractors doing business with the University of Louisiana at Lafayette)*

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**I. Purpose and Scope**

The purpose of this document is to ensure that third parties doing business with the University are adequately insured for the risk and liability associated with the goods, services, and/or work they provide to the University. This document sets forth the insurance language to be included in the bid and/or contract specifications when hiring contractors, vendors, or service providers to provide goods, perform services, and/or perform work for the University ("Contractors"). This document also sets forth the insurance language that should be included in all University contracts with Contractors ("Contracts"). This document applies to all Contracts to which the University is a party, including the individual departments and units of the University.

**II. General Insurance Requirements**

Except as expressly provided below with regard to Reduced Limits for Special Circumstances, the following language shall be included in (1) all Contractor bid and contract specifications, and (2) all Contracts. Requests for other variations in this language must be reviewed by the University's Risk Manager, who will make the final decision as to the language to be used. Please note that hazardous, unusual or exceptional activities, or a change in Contract indemnification provisions, may necessitate additional insurance; questions regarding the need for other coverage should be directed to the University's Risk Manager.

Contractor shall purchase, at its own cost and expense, and maintain for the duration of the Contract, insurance against claims for injuries to persons or damages to property which may arise from or in connection with the performance of the work hereunder by Contractor, its agents, representatives, employees, or subcontractors. The insurance shall be obtained from a company or companies lawfully authorized to do business in the State of Louisiana with a A.M. Best's rating of A-:VI or higher. Failure to comply with all terms of this section for the duration of the Contract places Contractor in breach of this Contract. Requests for any variation in this language will be reviewed by University's Risk Manager, who will make the final decision.

**A. Minimum Scope of Insurance and Limits****1. Workers Compensation**

Contractor shall be in compliance at all times with the Louisiana Workers' Compensation Law with respect to workers' compensation insurance or proper certification of self-insured status.

**2. Commercial General Liability**

Contractor shall maintain Commercial General Liability insurance, including Personal and Advertising Injury Liability, which coverage shall have a minimum limit per occurrence of \$1,000,000 and a minimum general aggregate of \$2,000,000. The Insurance Services Office (ISO) Commercial General Liability occurrence coverage form CG 00 01 (current form approved for use in Louisiana), or equivalent, is to be used in the policy. Claims-made form is unacceptable.

Additionally, if alcohol is served in the execution of this Contract, then Contractor shall maintain Liquor Liability coverage in the minimum amount of \$1,000,000 per occurrence.

Additionally, if valet parking is performed in the execution of this Contract, then Contractor shall maintain Garage Keepers Liability coverage in the minimum amount of \$1,000,000 per occurrence.

**3. Automobile Liability (if a Motor Vehicle owned, hired, or rented by the contractor is used in the performance of this Contract)**

Contractor shall maintain Automobile Liability Insurance, which coverage shall have a minimum combined single limit per occurrence of \$1,000,000. ISO form number CA 00 01 (current form approved for use in Louisiana), or equivalent, is to be used in the policy. This insurance shall include third-party bodily injury and property damage liability for owned, hired, and non-owned automobiles.

**B. Other Insurance Provisions**

Contractor shall either (i) require each subcontractor and vendor to procure and maintain all applicable insurance of the type and limits specified in this section, or (ii) include all subcontractors as insureds under its policies.

Any deductibles or self-insured retentions must be declared to and accepted by University. Contractor shall be responsible for all deductibles and self-insured retentions. Any insurance or self-insurance maintained by University shall be excess and non-contributory of Contractor's insurance. Contractor's coverage shall contain no special limitations on the scope of protection afforded to University. Contractor's insurance shall be primary as respects University, The Board of Supervisors for the University of Louisiana System ("Board"), and all of their respective officers, agents, employees, and volunteers.

Except for workers' compensation coverage, University and Board, and all of their respective officers, agents, employees, and volunteers, shall be named as an additional insured as regards negligence by Contractor. ISO Form CG 20 10 (current form approved for use in Louisiana), or equivalent, is to be used when applicable.

Contractor shall provide to University Certificates of Insurance ("Certificates") evidencing the foregoing coverage in advance of Contractor's delivery of goods and/or performance of work or services, and in all events, prior to any payment by University to Contractor. In addition to Certificates, Contractor shall submit to University the declarations page and the cancellation provisions for each insurance policy. University reserves the right to request complete certified copies of all required insurance policies at any time.

Certificates and all notices regarding coverage shall be addressed to:

University of Louisiana at Lafayette  
ATTN: Purchasing Department  
P.O. Box 40197  
Lafayette, LA 70504

Certificates of Insurance shall reflect that, to the fullest extent allowed by law, the insurer shall agree to waive all rights of subrogation against University, its officers, agents, employees, and volunteers for losses arising from work performed by the Contractor for University.

Coverage shall not be canceled, suspended, reduced, or voided by either Contractor or the insurer except after 30 days written notice has been given to University. Ten-day written notice of cancellation is acceptable for non-payment of premium. Notifications shall comply with the standard cancellation provisions in Contractor's policy.

Acceptance of goods or completed work by University, payment by University, failure of University to require proof of compliance, or University's acceptance of a non-compliant Certificate shall not release Contractor from its obligations under these insurance requirements. Failure of Contractor to purchase and/or maintain any required insurance shall not relieve Contractor from any liability or indemnification under the Contract.

**III. Additional Insurance Requirements for Special Contracts**

In addition to the foregoing insurance requirements, language specifying the following insurance requirements shall be included in: (1.) all bid and contract specifications for professional services and (2.) all Contracts for professional services, where applicable:

**A. Professional Liability, Errors and Omissions, and Malpractice Insurance**

If any of the following professionals provide services in the execution of the Contract, Contractor shall purchase and maintain Professional Liability Insurance, which coverage shall have minimum limits of \$1,000,000:

- Medical Professionals, such as physicians, nurses, dentists, and pharmacists;
- Architects and Engineers;
- Attorneys;
- Accountants and Professional Financial Advisors;
- Real Estate Brokers and Appraisers;
- Insurance Agents; and
- Consultants.

Claims-made coverage for Professional Liability Insurance is acceptable. The date of the inception of the policy must be no later than the first date of the anticipated work under this Contract. It shall provide coverage for the duration of this Contract and shall have an expiration date no earlier than 30 days after the anticipated completion of the Contract. The policy shall provide an extended reporting period of at least 24 months, with full reinstatement of limits, from the expiration date of the policy, if policy is not renewed.

#### **B. Cyber Liability Insurance**

For Contracts in which the Contractor shall be granted access to electronic data belonging to the University or others, including but not limited to corporate confidential information (CCI), personal financial information (PII), personal health information (PHI), payment card information (PCI), and all personal student information (PSI) stored in electronic format, and for which there is a risk of electronic security breaches of this confidential data, including inadvertent release, hacking, viruses, improper destruction, etc., Cyber liability insurance, including first-party costs, shall be required with a minimum limit per occurrence of \$1,000,000. Claims-made coverage is acceptable. The date of the inception of the policy must be no later than the first date of the anticipated work under this Contract. It shall provide coverage for the duration of this Contract and shall have an expiration date no earlier than 30 days after the anticipated completion of the Contract. The policy shall provide an extended reporting period of not less than 36 months from the expiration date of the policy, if the policy is not renewed. The policy shall not be cancelled for any reason, except non-payment of premium.

### **IV. Reduced Limits for Special Circumstances**

The scope of work for a bid or Contract may dictate that a reduction of insurance limits is necessary in order to facilitate competition and/or ensure the University's ability to hire qualified Contractors. Low risk activities which may justify a reduction in insurance limits include, but are not limited to:

- Services in which the owner/operator is the only Contractor employee;
- Services that do not involve the use of a motor vehicle;
- Services in which there is no use of hazardous or radioactive materials;
- Services in which there is no use of power machinery or tools;
- Services in which there is no use of high voltage equipment; and
- Services in which no work is actually performed on the University campus.

For these special circumstances, University's Director of Purchasing, at his/her discretion, may choose to reduce the insurance required of Contractor. If insurance requirements are so reduced, the reduction(s) must comply with the following guidelines:

#### **A. Workers Compensation**

University may waive workers' compensation insurance requirements for sole proprietors if they are the only person(s) employed by Contractor in performing the work or services specified in the Contract.

If coverage is so waived, the Contract must include language that Contractor agrees that such persons will have no cause of action against, and will not assert a claim against, University, the Board, and/or the State of

Louisiana, whether pursuant to the workers' compensation law of Louisiana or any other state, or other similar state or federal law, under any circumstance. The Contract must also include language that the parties agree that University, the Board, and the State of Louisiana, and all of their agents and employees, shall in no circumstance be, or considered as, the employer or statutory employer of Contractor, its owners, agents, or employees. The Contract must further include language that the parties agree that Contractor is a wholly independent contractor and is exclusively responsible for its own employees, owners, and agents, and that Contractor agrees to protect, defend, indemnify and hold University, the Board, and the State of Louisiana, and all of their agents and employees, harmless from any assertion or claim that may arise from the performance of this Contract.

#### **B. Commercial General Liability**

Commercial General Liability insurance, including Personal and Advertising Injury Liability, may be reduced to a minimum limit per occurrence of \$100,000. The Insurance Services Office (ISO) Commercial General Liability occurrence coverage form CG 00 01 (current form approved for use in Louisiana), or equivalent, is to be used in the policy. Claims-made form is unacceptable.

#### **C. Automobile Liability**

Automobile Liability Insurance requirements may be waived *only if* the scope of work does not involve the use of a motor vehicle. Examples include but are not limited to:

1. Goods and/or services that will be delivered to University by a third party (not Contractor); and
2. Goods and/or services that will be delivered to University electronically.

#### **D. Required Insurance Language**

Notwithstanding any reduction or waiver made pursuant to this section, all bid/contract specifications and all Contracts must include the language set forth in the General Insurance Requirements section, above, subject to modification only for the specific reduction or waiver made.

**END OF SECTION**

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**GENERAL REQUIREMENTS**

The Contractor shall furnish and install all labor and material necessary to provide and install the complete portion of this contract, including all materials and equipment as shown on the plans. It is the intention of these specifications that all systems be furnished complete with whatever necessary items are required to produce a satisfactory installation in a working order. The Contractor shall be responsible for bringing to the attention of the Owner any shortcomings of the design, or thereby, shall be responsible in full to meet the conditions set forth, that being, the system is to be in a satisfactory working order.

All material shall be installed in accordance with the instructions of the manufacturers. The work shall be done in strict compliance with state and local ordinances governing this class of work. The prospective bidder shall visit the job site and become familiar with all existing conditions found at the site. The Contractor shall become acquainted with all existing factors and conditions which affect the work. Failure to do so shall not relieve meeting the responsibility to install the work correctly.

The Contractor shall protect the entire installation from injury on the Project until final acceptance. Failure to do so shall be sufficient cause for the Agent to reject any work.

**CONSTRUCTION FORCE**

The Contractor shall provide and maintain in full operation at all times during the performance of the contract a sufficient work crew to execute the work with dispatch. The Contractor shall provide a full time superintendent who shall be on the job during all working periods.

The Contractor shall be responsible for maintenance and repair of all equipment installed by him which fails due to substandard workmanship.

**PARKING**

Contractor shall be responsible for all fees for temporary campus parking permits. The Facility Management department shall request the permits through the UL Parking and Transit department. Contractor shall be required to display the permit on their vehicles at all times while on campus. Failure to do so may result in parking citation.

**DEQ NOTIFICATION**

The Contractor shall be responsible for the proper notification of the Department of Environmental Quality whenever demolition work is to be performed. Copies of the DEQ Notification Form AAC-2 and any additional correspondence with DEQ shall be copied to the University.

**STANDARDS**

All materials furnished under this contract shall be designed, constructed and rated in accordance with the latest applicable standards, and shall pass tests as recommended therein.

**WORKMANSHIP AND MATERIALS**

The workmanship shall conform to the best accepted construction practice. Should it become evident that during the course of construction that the items indicated on the plans, are for any reason undesirable, the Contractor shall immediately bring the situation to the attention of the Agent for a decision. The Contractor shall be responsible for installing the proper materials as described by the drawings and specifications.

All materials furnished for this Project shall be new, undamaged, and bear the label of the Underwriters' Laboratories, Inc. Deliver materials in manufacturer's original package and store on skids so that the materials are off the ground, and so that product labels are exposed for easy inspection.

The Bidder shall base the proposal on materials herein specified. Reference to specific manufacturers or trade names is not intended to limit or indicate preference to specific manufacturers, but to indicate a standard of quality. Written approval from the Agent is required on all substitutions prior to installations.

**GUARANTEE**

The Contractor shall guarantee new materials and workmanship for a minimum of one (1) full year after formal acceptance of the Project. The Contractor will replace defective material and repair all workmanship defects promptly, and absorb all costs.

This provision shall not override any other warranties that are specified herein.

### **CAMPUS SAFETY POLICY**

Contractor shall adhere to the campus safety policy. Information regarding campus safety can be found on the UL Lafayette website at: <http://www.louisiana.edu/ehs>

### **LOUISIANA ONE CALL**

UL Lafayette is a member in the Louisiana One Call system. At least 72 hours before digging anywhere on UL Lafayette property the contractor **must** call 1-800-272-3020 to verify the location of utilities.

### **EXISTING LANDSCAPING**

Contractor is liable for any damages caused to the existing landscaping. All landscaping must be protected from root compaction and other physical damage. Contractor **must** provide three foot high orange construction fencing around the drip line of all trees within the construction site.

### **ASBESTOS**

The contractor **will not** be required to interface with any asbestos containing material (ACM) during this Project. The State of Louisiana has conducted an asbestos survey of all buildings on the UL Lafayette campus. The results of the survey are compiled in management plans for each building. The management plans were assembled according to the requirements set forth in the Department of Environmental Quality Required Elements Index. These plans are available for review to anyone interested in the results. The plans are kept on file in the Reserve Reading Room of Edith Garland Dupre' Library.

### **COORDINATION OF WORK**

The Contractor shall inform the Agent each day of his work location before proceeding to work, and each time the Contractor moves into a different area.

### **STORM WATER RUN OFF PROTECTION**

Contractor shall protect the entire construction site from erosion due to storm water run-off. A retention barrier shall be constructed around the entire construction site perimeter to prevent erosion from infiltrating the storm water drainage system.

### **PAYMENT**

The Contractor may invoice the Owner for work performed on a monthly basis. The work performed shall meet the approval of UL Lafayette. UL Lafayette shall process payment after verification of the invoice.

On Projects where a performance bond is specified, the University will withhold ten percent (10%) retainage from all payments for completed work. The retainage will be released to the contractor according to the procedures set forth in the "INSTRUCTIONS TO BIDDERS AND GENERAL CONDITIONS", section 10.

**FINAL PAYMENT WILL NOT BE ISSUED UNTIL ALL UNIVERSITY KEYS HAVE BEEN RETURNED TO THE FACILITY MANAGEMENT OFFICE.**

### **CLEAN-UP**

The Contractor is responsible for the daily clean-up and disposal of all trash and construction debris relating to this Project. University dumpsters shall **not** be used for the disposal of debris. Should the Contractor dispose of any debris into University facilities, the cost of removal will be deducted from the University's final payment under this contract. Occupied areas (e.g.: Classrooms, Offices, Labs, etc.) shall be broom cleaned and vacuumed at the end of the work day to allow use of the room by the University. Debris and materials shall be removed from the rooms to allow use of the room by the University.

**INDEMNIFICATION**

The Contractor will indemnify and hold harmless the Owner and all of their agents and employees from and against all claims, damages, losses, and expenses including attorney's fees arising out of or resulting from operations under the Contract Documents by the Contractor, and subcontractor, anyone directly or indirectly employed by any of them, or anyone for whose acts any of them may be liable, which are caused in whole or in part by any error, omission, or act of any of them. If any and all claims against the Owner or any of their agents or employees by any employee of the Contractor, subcontractor, anyone directly or indirectly employed by any of them, or anyone for whose acts any of them may be liable, the indemnification obligation of the Contractor under this article shall not be limited in any way by any limitation on the amount or type of damages, compensation or benefits payable by or for the Contractor or any subcontractor under Workmen's Compensation laws.

**SPECIAL HEALTH & SAFETY RELATED CONTRACT CLAUSES:****1. ADDITIONAL CONTRACTOR REQUIREMENTS AND LIMITATION OF LIABILITY**

It is expressly understood and agreed by the parties that:

- (a) CONTRACTOR shall not visit or utilize the facilities of University if CONTRACTOR (i) experiences symptoms of COVID-19, including, without limitation, fever, cough, or shortness of breath, or (ii) has a suspected or diagnosed/confirmed case of COVID-19, and CONTRACTOR shall notify University immediately if he or she believes that any of the foregoing access/use restrictions may apply;
- (b) University has taken certain steps to implement recommended guidance and protocols issued by the Centers for Disease Control ("CDC") and Louisiana Department of Health ("LDH") for slowing the transmission of COVID-19, including, without limitation, the access/use restrictions, and distancing and sanitization requirements set forth herein, and that University may revise its procedures at any time based on updated recommended guidance and protocols issued by the CDC and LDH and CONTRACTOR agrees to comply with University's current and revised procedures prior to utilizing the facilities of University;
- (c) CONTRACTOR acknowledges and agrees that, due to the nature of the facilities and the services CONTRACTOR is providing to University, social distancing of six (6) feet per person may not always be possible and CONTRACTOR fully understands and appreciates both the known and potential dangers of utilizing the facilities of University and acknowledges that use thereof by CONTRACTOR may, despite University's reasonable efforts to mitigate such dangers, result in exposure to COVID-19, which could result in quarantine requirements, serious illness, disability, and/or death; and
- (d) while University has instituted measures to sanitize common areas, CONTRACTOR shall be responsible for the daily sanitization of his/her personal workspace prior to and immediately preceding CONTRACTOR's use of the space. Under no circumstances shall University be liable to CONTRACTOR, or CONTRACTOR's personal representatives, assigns, heirs, and next of kin for any loss or damage, or any claim or demands on account of any property damage or any injury to, or an illness or the death of, the CONTRACTOR (or any person who may contract COVID-19, directly or indirectly, from the CONTRACTOR) whether caused by the negligence, active or passive, of University or otherwise while CONTRACTOR is in, upon, of about the premises or any facilities or equipment therein of University.

**FORCE MAJEURE**

Notwithstanding anything to the contrary in this Agreement, neither party shall be liable to the other or be deemed to be in breach of this Agreement for any failure or delay in whole or partial performance under this Agreement when such failure or delay is caused in whole or in part by a "Force Majeure Event," which shall be defined as any event beyond the control of a party, including, but not limited to: labor disputes, strike, riot, vandalism, sabotage, terrorist act, war (whether declared or undeclared), inclement weather, flood (whether naturally occurring or manmade), tidal surge or



tsunami, landslide, earthquake, fire (whether naturally occurring or manmade), explosion, power shortage or outage, fuel shortage, embargo, congestion or service failure, epidemic, or government regulation, proclamation, order, or action; and in each case not involving the fault or negligence of a party.

If any Force Majeure Event occurs affecting a party's performance under this Agreement, the affected party will give written notice within five (5) days of the occurrence of the Force Majeure Event to the other party and will use commercially reasonable efforts to minimize the impact of the Force Majeure Event. In the event of a Force Majeure Event resulting in a total or partial performance or service failure by either party, the University, in its sole discretion, may immediately terminate this Agreement. To the extent that services have been rendered and deemed acceptable by University, the service fee and other fees and charges payable by University hereunder shall be paid to the Contractor on a pro-rata basis. For those services which the Contractor is unable to perform under this Agreement as a result of such Force Majeure Event, University shall suspend all related payments until such services are restored.

**END OF SECTION**

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## LOUISIANA UNIFORM PUBLIC WORK BID FORM

TO: University of Louisiana at Lafayette  
Purchasing Office, Martin Hall Room 123  
104 University Circle  
PO Box 40197  
Lafayette, LA 70504

BID FOR: RENOVATIONS TO LABORATORY  
ABDALLA HALL  
File No. 23202

The undersigned bidder hereby declares and represents that she/he: a) has carefully examined and understands the Bidding Documents, b) has not received, relied on, or based his bid on any verbal instructions contrary to the Bidding Documents or any addenda, c) has personally inspected and is familiar with the Project site, and hereby proposes to provide all labor, materials, tools, appliances and facilities as required to perform, in a workmanlike manner, all work and services for the construction and completion of the referenced Project, all in strict accordance with the Bidding Documents prepared by:

University of Louisiana at Lafayette and dated: May 2022.  
(Owner to provide name of entity preparing bidding documents.)

Bidder must acknowledge all addenda. The Bidder acknowledges receipt of the following ADDENDA: (Enter the number the Designer has assigned to each of the addenda that the Bidder is acknowledging) \_\_\_\_\_

TOTAL BASE BID: For all work required by the Bidding Documents (including any and all unit prices designated "Base Bid"\* but not alternates) the sum of:

\_\_\_\_\_ Dollars (\$ \_\_\_\_\_)

ALTERNATES: For any and all work required by the Bidding Documents for Alternates including any and all unit prices designated as alternates in the unit price description.

Alternate No. 1 *Add to furnish and install (6) new roof curbs and associated roof work for the lump sum of:*

\_\_\_\_\_ Dollars (\$ \_\_\_\_\_)

Alternate No. 2 *Add furnish and install new light fixtures and exit light in room 201 for the lump sum of:*

\_\_\_\_\_ Dollars (\$ \_\_\_\_\_)

Alternate No. 3 *Add install new vinyl plank flooring and base in room 201 for the lump sum of:*

\_\_\_\_\_ Dollars (\$ \_\_\_\_\_)

NAME OF BIDDER: \_\_\_\_\_

ADDRESS OF BIDDER: \_\_\_\_\_

LOUISIANA CONTRACTOR'S LICENSE NUMBER: \_\_\_\_\_

NAME OF AUTHORIZED SIGNATORY OF BIDDER: \_\_\_\_\_

TITLE OF AUTHORIZED SIGNATORY OF BIDDER: \_\_\_\_\_

SIGNATURE OF AUTHORIZED SIGNATORY OF BIDDER\*\*: \_\_\_\_\_

DATE: \_\_\_\_\_

\* The **Unit Price Form** shall be used if the contract includes unit prices. Otherwise, it is not required and need not be included with the form. The number of unit prices that may be included is not limited and additional sheets may be included if needed.

\*\* A **CORPORATE RESOLUTION OR WRITTEN EVIDENCE** of the authority of the person signing the bid for the public work as prescribed by LA R.S. 38:2212(B)(5).

**BID SECURITY** in the form of a bid bond, certified check or cashier's check as prescribed by LA RS 38:2218(A) attached to and made a part of this bid.

**ATTESTATIONS AFFIDAVIT – PAGE 1 OF 2**

**NOTE: Affidavit submitted with the Bid Documents, prior to the opening of bids, will not be accepted in accordance with LA. R.S. 38:2212.10.**

**RENOVATIONS TO ABDALLA HALL LABORATORY****23202****Name of Project****Project No.**STATE OF LOUISIANAPARISH OF LAFAYETTE**ATTESTATIONS AFFIDAVIT**

**Before me**, the undersigned notary public, duly commissioned and qualified in and for the parish and state aforesaid, personally came and appeared Affiant, who after being duly sworn, attested as follows:

**LA. R.S. 38:2227 PAST CRIMINAL CONVICTIONS OF BIDDERS**

- A. No sole proprietor or individual partner, incorporator, director, manager, officer, organizer, or member who has a minimum of a ten percent (10%) ownership in the bidding entity named below has been convicted of, or has entered a plea of guilty or nolo contendere to any of the following state crimes or equivalent federal crimes:

(a) Public bribery (R.S. 14:118)

(c) Extortion (R.S. 14:66)

(b) Corrupt influencing (R.S. 14:120)

(d) Money laundering (R.S. 14:23)

- B. Within the past five years from the Project bid date, no sole proprietor or individual partner, incorporator, director, manager, officer, organizer, or member who has a minimum of a ten percent (10%) ownership in the bidding entity named below has been convicted of, or has entered a plea of guilty or nolo contendere to any of the following state crimes or equivalent federal crimes, during the solicitation or execution of a contract or bid awarded pursuant to the provisions of Chapter 10 of Title 38 of the Louisiana Revised Statutes:

(a) Theft (R.S. 14:67)

(f) Bank fraud (R.S. 14:71.1)

(b) Identity Theft (R.S. 14:67.16)

(g) Forgery (R.S. 14:72)

(c) Theft of a business record

(h) Contractors; misapplication of payments (R.S. 14:202)

(R.S.14:67.20)

(d) False accounting (R.S. 14:70)

(i) Malfeasance in office (R.S. 14:134)

(e) Issuing worthless checks

(R.S. 14:71)

**LA. R.S. 38:2212.10 Verification of Employees**

A. At the time of bidding, Appearer is registered and participates in a status verification system to verify that all new hires in the state of Louisiana are legal citizens of the United States or are legal aliens.

B. If awarded the contract, Appearer shall continue, during the term of the contract, to utilize a status verification system to verify the legal status of all new employees in the state of Louisiana.

C. If awarded the contract, Appearer shall require all subcontractors to submit to it a sworn affidavit verifying compliance with Paragraphs (A) and (B) of this Subsection.

**ATTESTATIONS AFFIDAVIT – PAGE 2 OF 2****RENOVATIONS TO ABDALLA HALL LABORATORY****Name of Project****23202****Project No.****LA. R.S. 23:1726(B) Certification Regarding Unpaid Workers Compensation Insurance**

A. R.S. 23:1726 prohibits any entity against whom an assessment under Part X of Chapter 11 of Title 23 of the Louisiana Revised Statutes of 1950 (Alternative Collection Procedures & Assessments) is in effect, and whose right to appeal that assessment is exhausted, from submitting a bid or proposal for or obtaining any contract pursuant to Chapter 10 of Title 38 of the Louisiana Revised Statutes of 1950 and Chapters 16 and 17 of Title 39 of the Louisiana Revised Statutes of 1950.

B. By signing this bid /proposal, Affiant certifies that no such assessment is in effect against the bidding /proposing entity.

\_\_\_\_\_  
**NAME OF BIDDER**\_\_\_\_\_  
**NAME OF AUTHORIZED SIGNATORY OF BIDDER**\_\_\_\_\_  
**DATE**\_\_\_\_\_  
**TITLE OF AUTHORIZED SIGNATORY OF BIDDER**\_\_\_\_\_  
**SIGNATURE OF AUTHORIZED  
SIGNATORY OF BIDDER/AFFIANT**

**Sworn to and subscribed** before me by Affiant on the \_\_\_\_ day of \_\_\_\_\_, 20\_\_ .

\_\_\_\_\_  
Notary Public

**NON-COLLUSION AFFIDAVIT PAGE 1 OF 1**STATE OF LOUISIANA[X] PARISH OF LAFAYETTE

[ ] COUNTY OF \_\_\_\_\_

**AFFIDAVIT ATTESTING THAT PUBLIC CONTRACT  
WAS NOT, NOR WILL NOT BE SECURED  
THROUGH EMPLOYMENT OR PAYMENT OF SOLICITOR**

**KNOW ALL MEN BY THESE PRESENCE, that a public contract is contemplated  
between**

**University of Louisiana at Lafayette and**  
\_\_\_\_\_ ,

**represented by (print or type) \_\_\_\_\_ attests that s/he is  
empowered and authorized to execute said documents.**

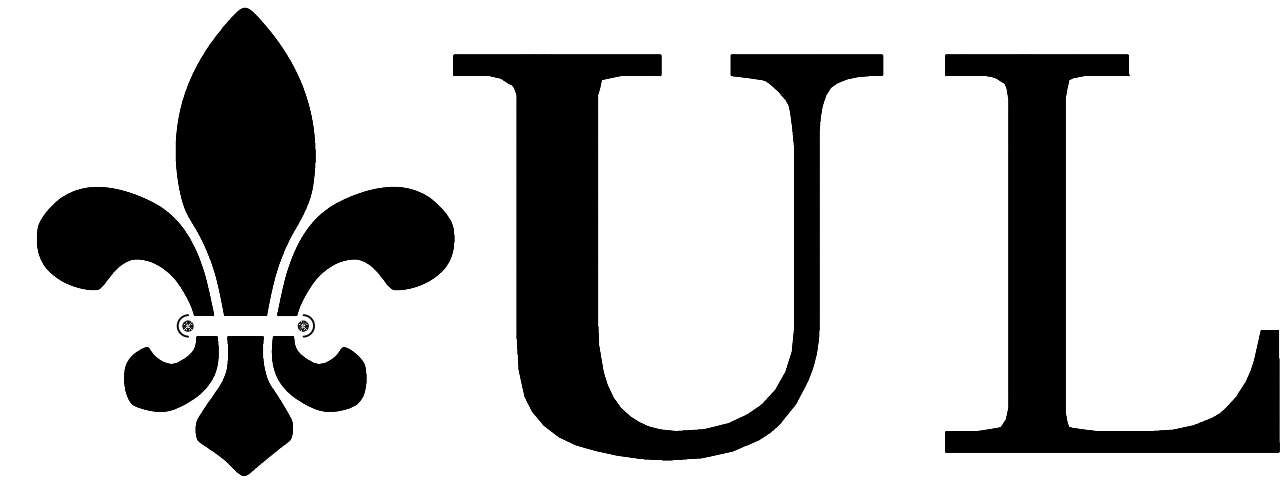
**FURTHER, (signature) \_\_\_\_\_, who being duly sworn, does  
depone and attest that:**

- 1) Affiant employed no person, corporation, firm, association, or other organization, either directly or indirectly, to secure the public contract under which he received payment, other than persons regularly employed by the affiant whose services in connection with the construction, alteration or demolition of the public building or Project or in securing the public contract wherein the regular course of their duties for affiant; and**
- 2) That no part of the contract price received by affiant was paid or will be paid to any person, Corporation, firm, association, or other organization for soliciting the contract, other than the payment of their normal compensation to persons regularly employed by the affiant whose services in connection with the construction, alteration or demolition of the public building or Project were in the regular course of their duties for affiant.**

**BEFORE ME, the representing authority, personally appeared, who being duly sworn, deposes and states that the above is true and correct in all respects recited.**

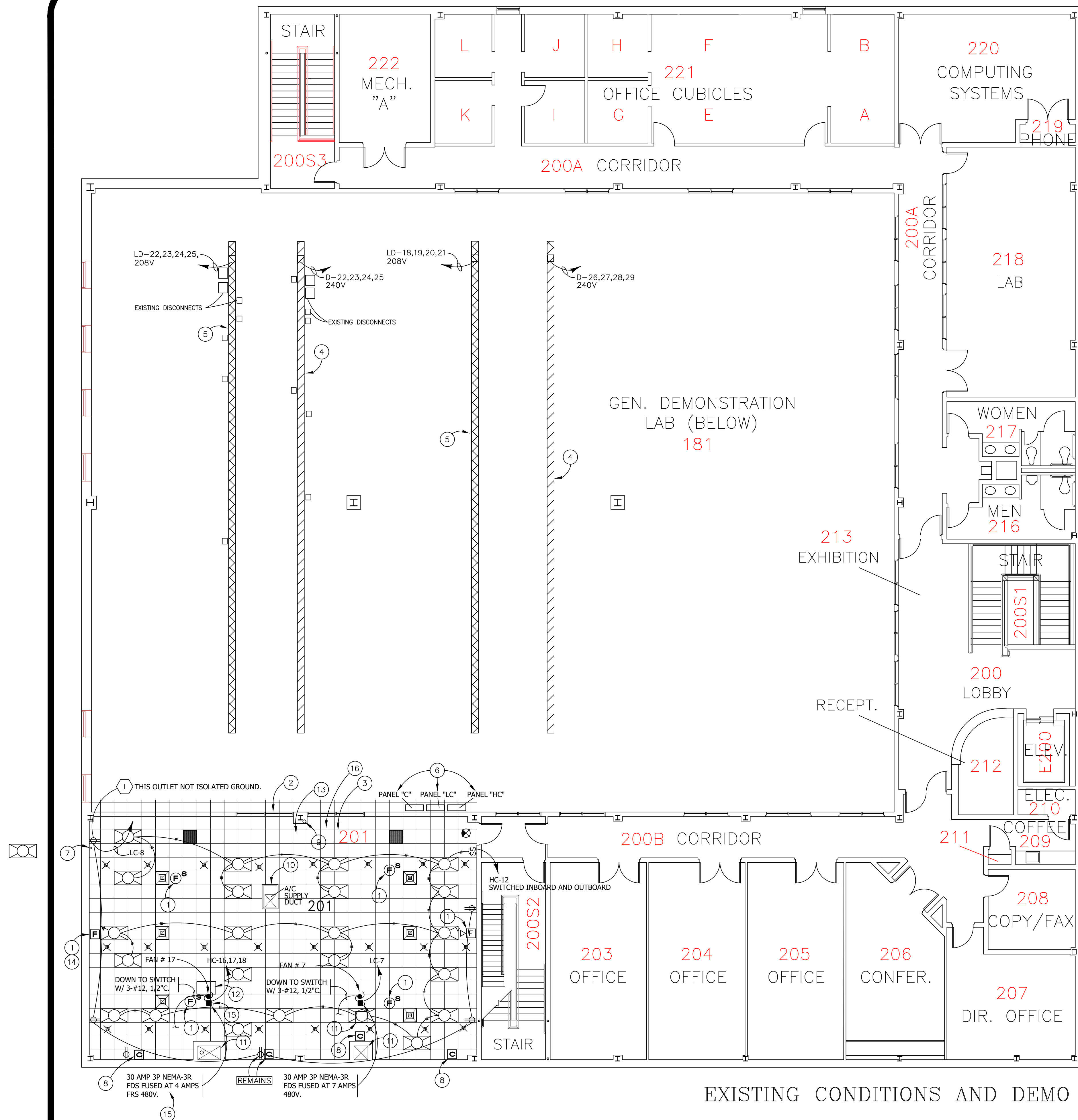
**SWORN TO AND SUBSCRIBED before me, this \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_\_\_.**

\_\_\_\_\_  
**Notary Public**



UNIVERSITY OF LOUISIANA  
AT LAFAYETTE

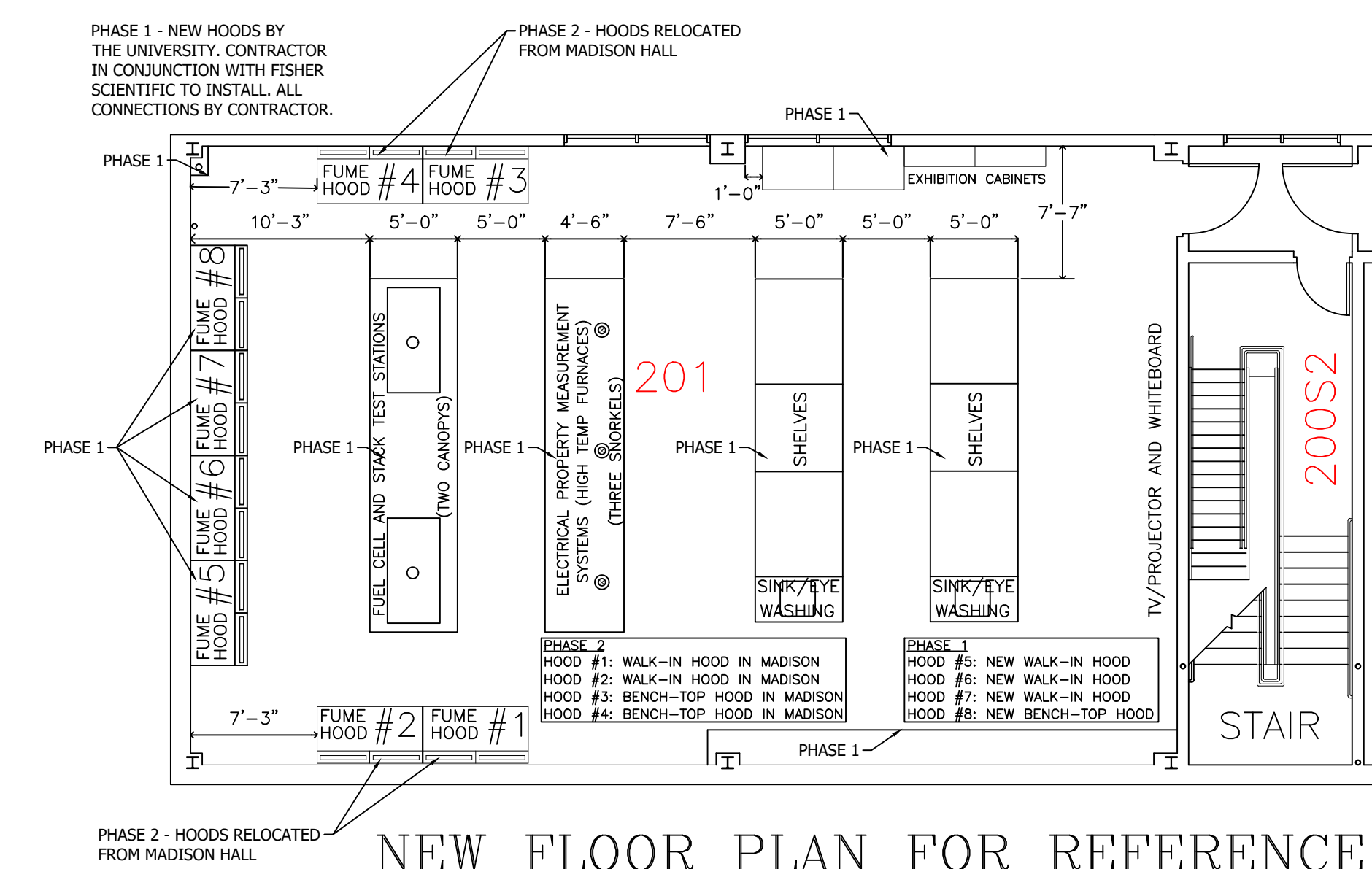
ABDALLA HALL  
ROOM 201 RENOVATIONS  
PHASE 1



## PHASE 1

- GENERAL AND DEMO NOTES:

- ① CONTRACTOR SHALL CONTACT THE UNIVERSITY PRIOR TO ANY AND ALL DEMO OR CONSTRUCTION PRIOR TO DISARM (PUT IN "TEST" MODE) THE EXISTING FIRE ALARM SYSTEM. CONTRACTOR SHALL THEN BAG ALL DEVICES TO PROTECT THEM FROM CONSTRUCTION DUST. CEILING MOUNTED DEVICES SHALL BE REMOVED FROM THE CEILINGS AND TIED UP TO STRUCTURE AND REINSTALLED IN THE SAME LOCATION AFTER CEILING IS REINSTALLED.
- ② CONTRACTOR TO REMOVE EXISTING WINDOW, SECTION OF BLOCK WALL BELOW WINDOW, SHEET ROCK, SIDING, AND FRAMING, ENOUGH TO AND INSTALL A TEMPORARY PLYWOOD OPENING (MIN. 5' x 10') FOR THE PASSAGE OF FUME HOODS AND ASSOCIATED MATERIALS. AFTER PHASE 2, REINSTALL REMOVED SECTION OF BLOCK WALL FRAMING, WINDOW, AND SHEET ROCK. STORE AND PROTECT WINDOW FRAME FROM DAMAGE. IF EXISTING WINDOW IS DAMAGED DURING CONSTRUCTION, IT SHALL BE REPLACED AT NO COST TO THE UNIVERSITY. PREP AND PAINT ENTIRE SECTION OF WALL.
- ③ CAREFULLY REMOVE EXISTING SUSPENDED CEILING SYSTEM IN ROOM 201 ENOUGH REQUIRED TO INSTALL NEW MECHANICAL AND ELECTRICAL EQUIPMENT BEING CAREFUL NOT TO DAMAGE EXISTING CEILING GRID AND TILE. THE EXISTING CEILING SYSTEM IS CONTINUOUS FROM ROOM 201 TO OPEN BAY ROOM 181. CONTRACTOR SHALL TAKE ANY/ALL PRECAUTIONS NOT TO DAMAGE, DESTROY, OR CAUSE THE CEILING IN ROOM 181 TO FALL OR SHIFT. ANY DAMAGE SHALL BE REPAIRED/REPLACED AT NO COST TO THE OWNER. REMOVE EXISTING CEILING DEVICES (FIRE ALARM, WIFI, ETC.) AS REQUIRED FROM CEILING GRID AND TIE UP TO STRUCTURE ABOVE AND TO BE REINSTALLED. EXISTING LIGHT FIXTURES SHALL BE REMOVED AND REINSTALLED AT A THE NEW LOCATIONS AND LAYOUT SHOWN. REMOVE SECTIONS OF EXISTING CEILING GRID AND TILE IN OPEN LAB ROOM 181 TO ALLOW OTHER TRADES TO INSTALL THEIR EQUIPMENT AND MATERIALS, THEN REINSTALL.
- ④ EXISTING 240/3/60 VOLT BUSS DUCT.
- ⑤ EXISTING 208/3/60 VOLT BUSS DUCT.
- ⑥ EXISTING PANELS "C", "LC", AND "HC".
- ⑦ EXISTING 1-1/2" STEEL GAS LINE TO REMAIN. PAINT TO MATCH WALL.
- ⑧ EXISTING DATA OUTLETS TO BE RELOCATED. REUSE EXISTING WIRE MOLD AND BOX FOR TV. RELOCATE (2) OTHERS JUST BELOW CENTRALIZED CONTROLLER AND GAS MONITOR LOCATIONS ON NEW CHASE WALL.
- ⑨ EXISTING 3" VENT FOR FUTURE USE FOR NEW SINK DRAIN CONNECTION IN THIS VICINITY.
- ⑩ REMOVE EXISTING HVAC CHASE WALL. INSTALL NEW BRACING AS NEEDED, MATCHING METAL DECK, #4 REBAR 6" ON CENTER BOTH WAYS DOWELED IN TO EXISTING FLOOR SLAB, AND POUR 3000 PSI CONCRETE TO FILL OPENING TO A SMOOTH FINISH.
- ⑪ REMOVE ALL EXISTING CHASE (BLOCK AND DRYWALL) AND DUCT FROM ABOVE CEILING TO AND THRU 2nd FLOOR SLAB.
- ⑫ REMOVE EXISTING EXHAUST FAN #7, EXHAUST FAN #17, ALL CURBS, AND ELECTRICAL SERVICE TO FANS BACK TO NEAREST "J" BOX ABOVE CEILING. EXISTING CIRCUIT AND DISCONNECT FROM FAN #17 SHALL BE REUSED.
- ⑬ ALTERNATE NO.3 - REMOVE EXISTING CARPET AND GLUE FROM CONCRETE IN ROOM 201 TO RECEIVE NEW FLOORING.
- ⑭ THE UNIVERSITY SHALL REMOVE AND RELOCATE EXISTING WALL MOUNTED FIRE ALARM DEVICES UP TO 6" BELOW CEILING IN LOCATION SHOWN ON PLAN SHEET E2. CONTACT THE UNIVERSITY TO HAVE THIS DONE.
- ⑮ EXISTING DISCONNECT AND WIRING, AND CONDUIT FOR EXISTING EXHAUST FAN #17 TO BE REUSED. INSTALL DISCONNECT ON WALL WHERE SHOWN ON PLAN SHEET E2. REPLACE EXISTING 7-AMP FUSES WITH 20 AMP FUSES. RUN NEW CONDUIT FROM EXISTING "J" BOX TO DISCONNECT LOCATION AND PULL EXISTING WIRE TO DISCONNECT. RUN FLEX FROM DISCONNECT TO ARBIN EQUIPMENT AND CONNECT AS REQUIRED. RUN NEW CONDUIT FOR DISCONNECT IN NEW CHASE WALL AND EXIT TO DISCONNECT. SAND AND PAINT DISCONNECT WALL COLOR.
- ⑯ THE EXISTING CARPET SHALL BE REMOVED PRIOR TO THIS CONTRACT SHOULD ALTERNATE NO.3 IS NOT ACCEPTED.



## EXISTING CONDITIONS AND DEMO PLAN

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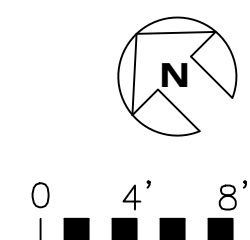
ABDALLA HALL  
ROOM 201 RENOVATIONS - PHASE 1

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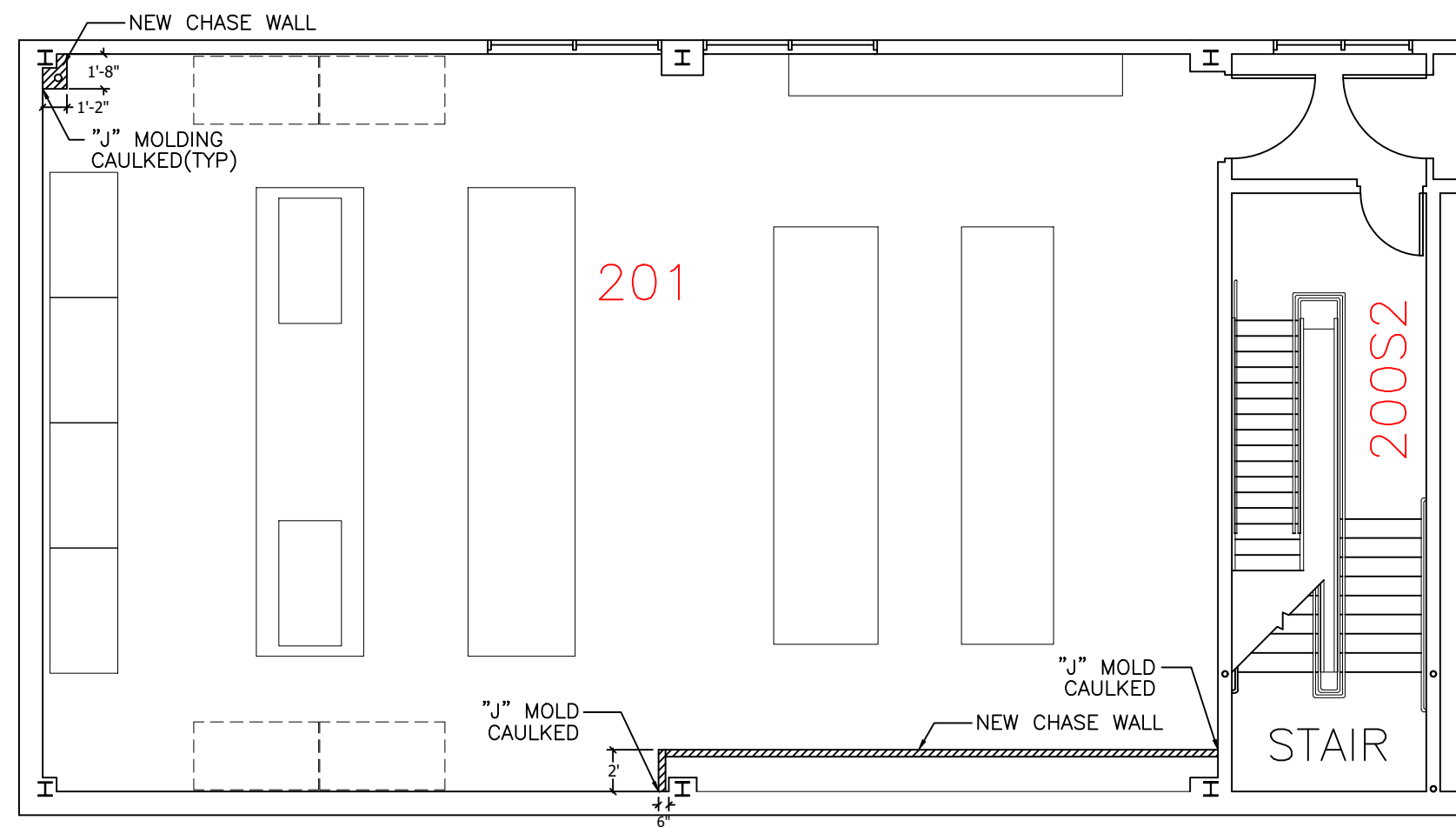


## PHASE 1

PROJECT NO:	SHEET:  <b>A1</b>
DATE: APRIL 2022	
SCALE: *'' = 1' - 0"	



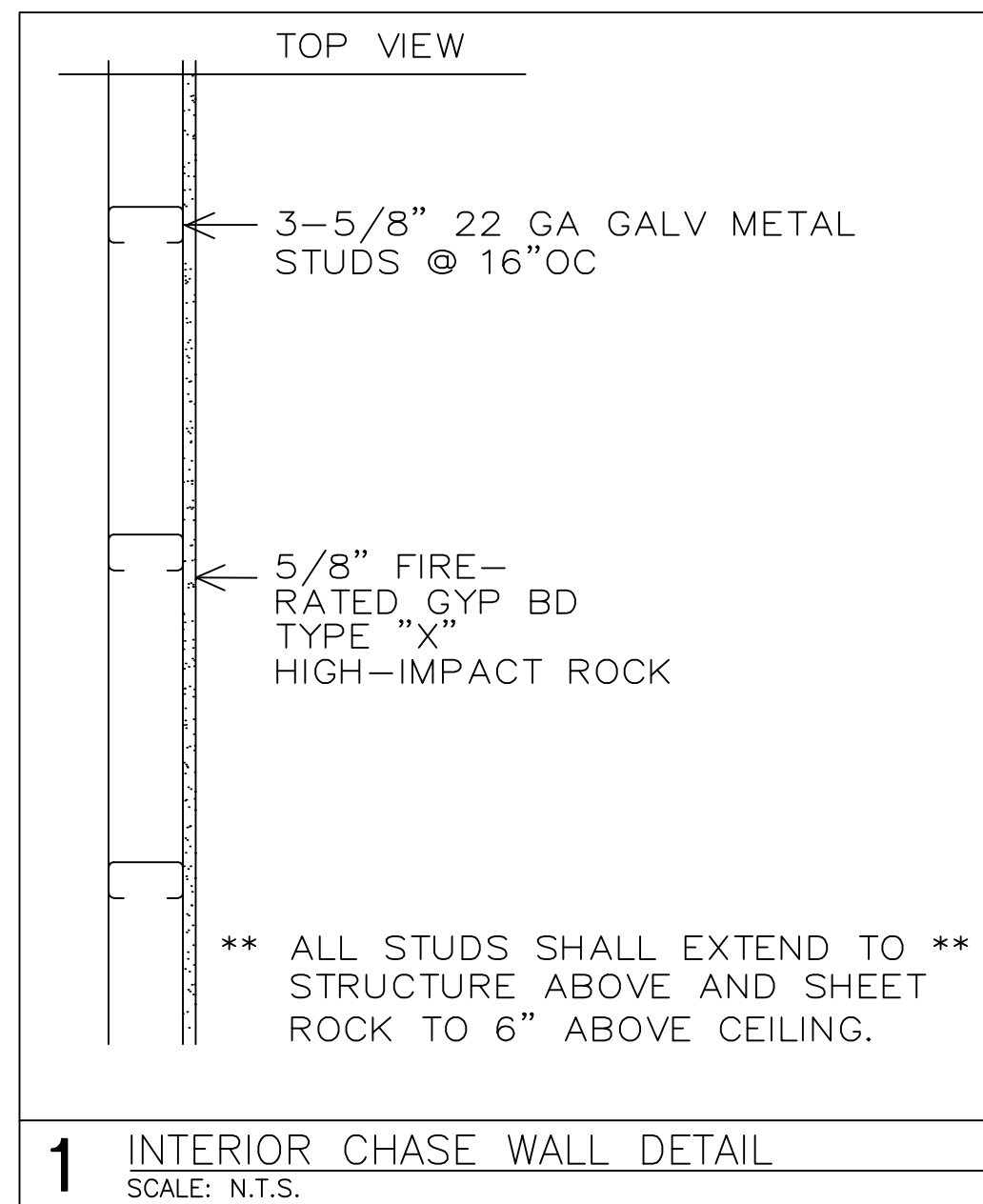




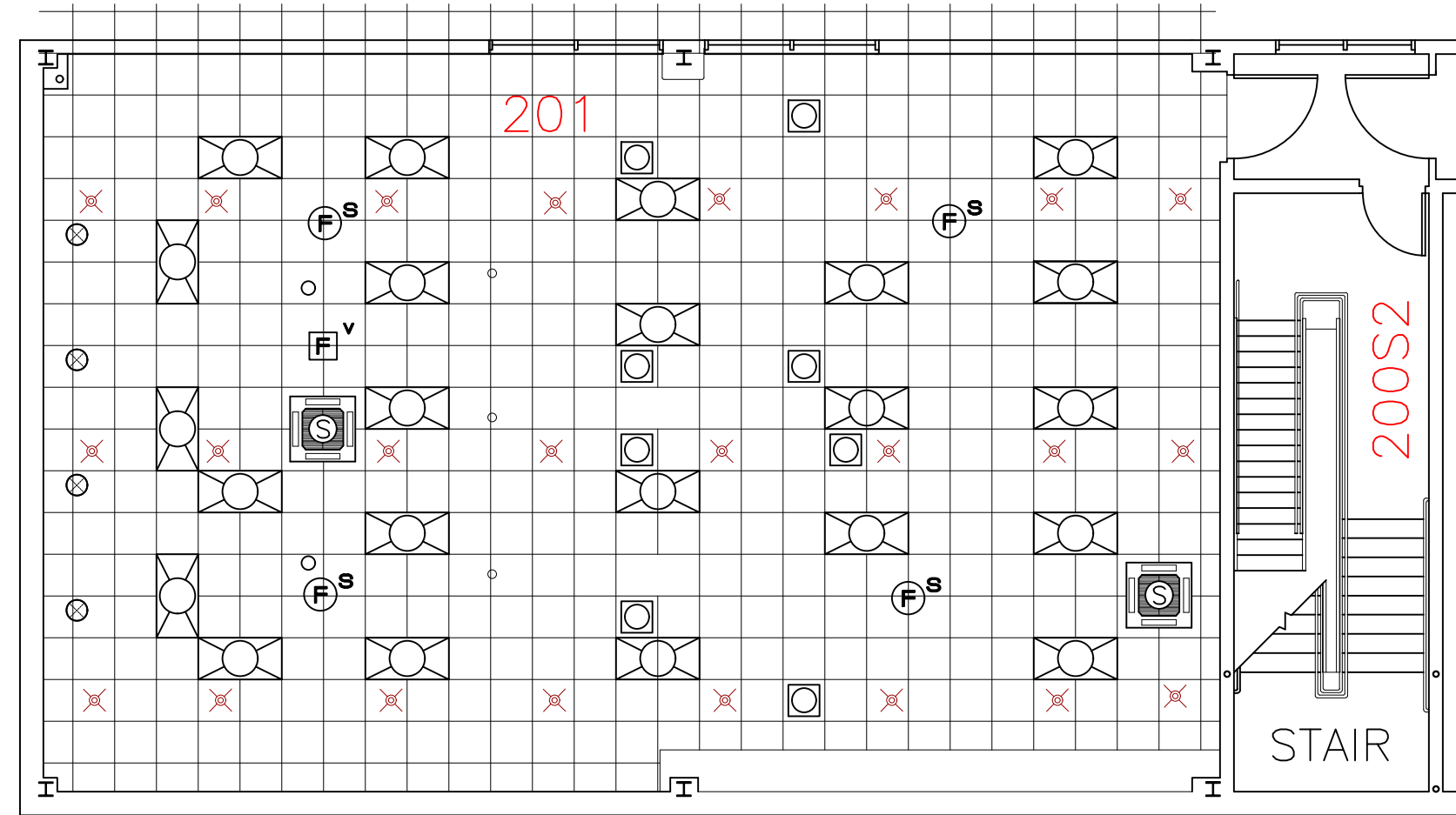
NEW FLOOR PLAN/NEW CHASES/WALLS

GENERAL NOTES:

- ① CONTRACTOR SHALL CONSTRUCT NEW CHASE WALLS AS SHOWN ON PLANS. NEW WALLS SHALL BE CONSTRUCTED WITH 3-1/2" METAL STUDS AND 5/8" TYPE "X", HIGH-IMPACT SHEET ROCK. NEW WALL STUDS SHALL BE FROM FLOOR TO DECK AND SHEET ROCK SHALL FINISH 6" ABOVE CEILING. INSTALL A "J" MOLDING AT ALL NEW SHEET ROCK WALL EDGES FOR A UNIFORM FINISH FROM ROCK TO BLOCK. CAULK "J" MOLDING TO BLOCK PRIOR TO PAINTING. TAPE, FLOAT, SAND, PRIME, AND PAINT ALL NEW WALLS. NEW CHASE WALLS ARE FOR MECHANICAL AND ELECTRICAL PIPING.
- ② CONTRACTOR SHALL REPAIR EXISTING WALL WHERE EXISTING WINDOW WAS REMOVED FOR EQUIPMENT PASSAGE. PREP, PRIME, AND PAINT WALL.
- ③ CONTRACTOR SHALL REPAIR ALL DEFICIENCIES ON ALL EXISTING WALLS. NEW AND EXISTING WALLS SHALL BE PREPPED, PRIMED, AND PAINTED. COLOR SHALL BE SELECTED BY THE UNIVERSITY.
- ④ FLOORING — SEE PLAN SHEET AL1 FOR ALTERNATE NO.3 INFORMATION. PROTECT NEW FLOOR FROM DAMAGE DURING THE INSTALLATION OF THE NEW LAB EQUIPMENT AND DURING CONSTRUCTION.
- ⑤ CONTRACTOR SHALL CLEAN CONSTRUCTION AREA DAILY. CONTRACTOR SHALL MAKE ALL NECESSARY PRECAUTIONS TO MAKE SURE CONSTRUCTION DUST DOES NOT ESCAPE FROM ROOM 201 TO OTHER AREAS OF THE BUILDING. CONTRACTOR SHALL NOT USE THE EXISTING ELEVATOR OR RESTROOM FACILITIES.



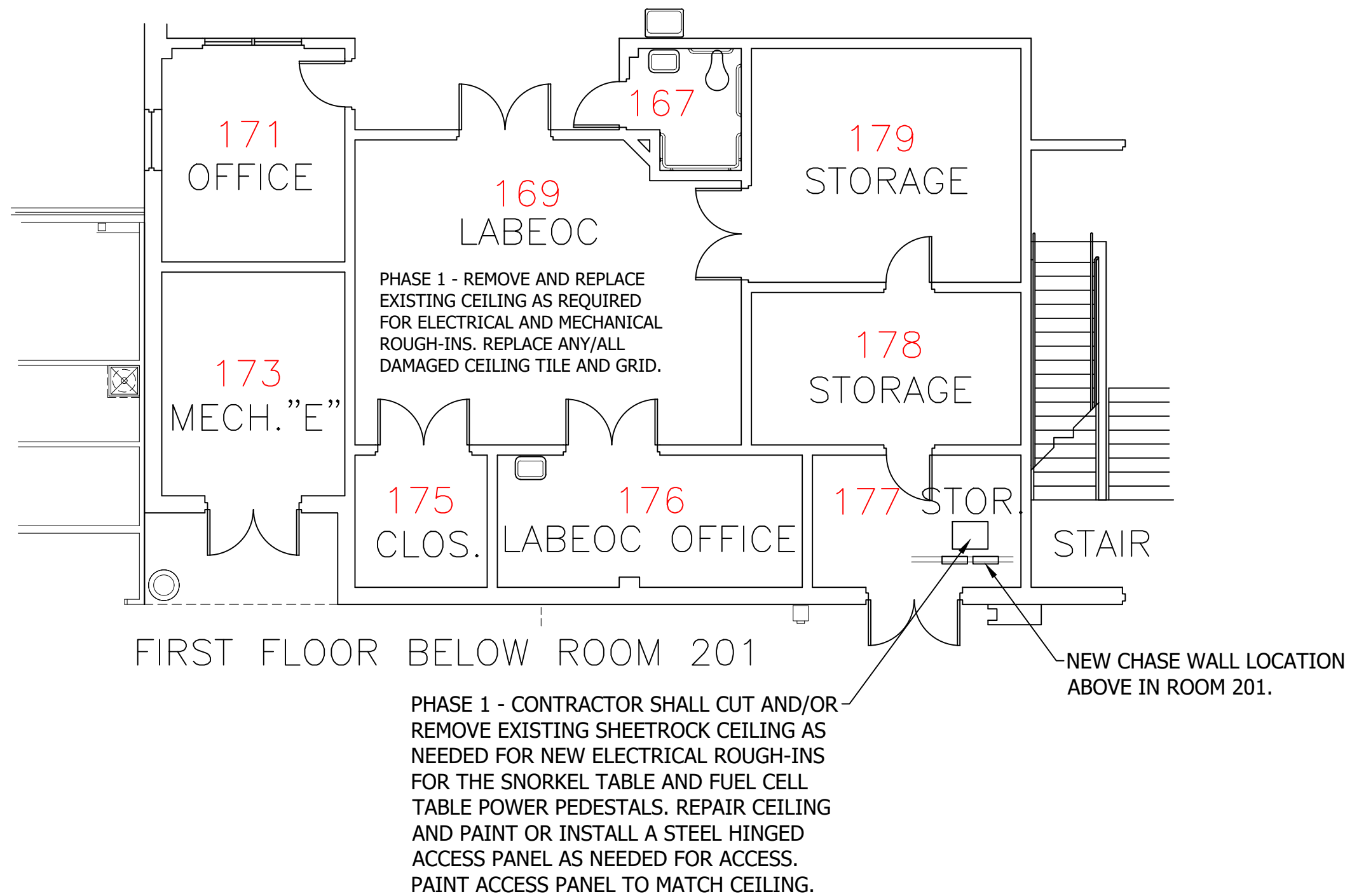
PHASE 1



SUSPENDED CEILING PLAN

GENERAL NOTES:

- ① CONTRACTOR SHALL CAREFULLY REMOVE ENOUGH REQUIRED SUSPENDED CEILING SYSTEM IN ROOM 201 TO ALLOW MECHANICAL AND ELECTRICAL WORK TO BE DONE ABOVE CEILING THEN REINSTALL IT IN IT'S ORIGINAL LOCATION AND ELEVATION. REMOVE ANY EXISTING CEILING DEVICES IF NEEDED AND REINSTALL THEM AFTER CEILING IS REINSTALLED. FIRE ALARM DEVICES ON CEILING GRID SHALL COVERED WITH A PLASTIC BAG, REMAIN CONNECTED, AND TIED ABOVE TO STRUCTURE THEN REINSTALLED AFTER WORK IS COMPLETED. NOTE THAT EXISTING CEILING GRID EXTENDS FROM ROOM 201 TO OPEN LAB 181. CONTRACTOR SHALL SECURE EXISTING CEILING GRID PRIOR TO REMOVAL TO PREVENT CEILING GRID FROM SHIFTING, RACKING, AND FALLING IN EACH ROOM. ANY DAMAGE TO EXISTING CEILING GRID OR TILES SHALL BE REPLACED AT NO COST TO THE OWNER.
- ② COORDINATE CEILING GRID REMOVAL AND REINSTALLATION WITH ALL TRADES. REINSTALL EXISTING CEILING DEVICES REMOVED DURING REMOVAL OF CEILING GRID (FIRE ALARM, WIFI, ETC.). COORDINATE FIRE ALARM REINSTALLATION WITH THE UNIVERSITY TO PREVENT AN ALARM ACTIVATION WHEN CONNECTING OR DISCONNECTING FIRE ALARM DEVICES.
- ③ NOTE THAT THE EXISTING LIGHT FIXTURES SHALL BE INSTALLED IN A DIFFERENT LOCATION AND THIS CONTRACTOR SHALL COORDINATE AS SUCH. CONTRACTOR SHALL PROVIDE ALL MATERIALS AND LABOR TO RELOCATE THE EXISTING LIGHT FIXTURES.



CONSTRUCTION PLAN

GENERAL NOTES		
NO:	REVISIONS:	DATE:

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ROOM 201 RENOVATIONS - PHASE 1

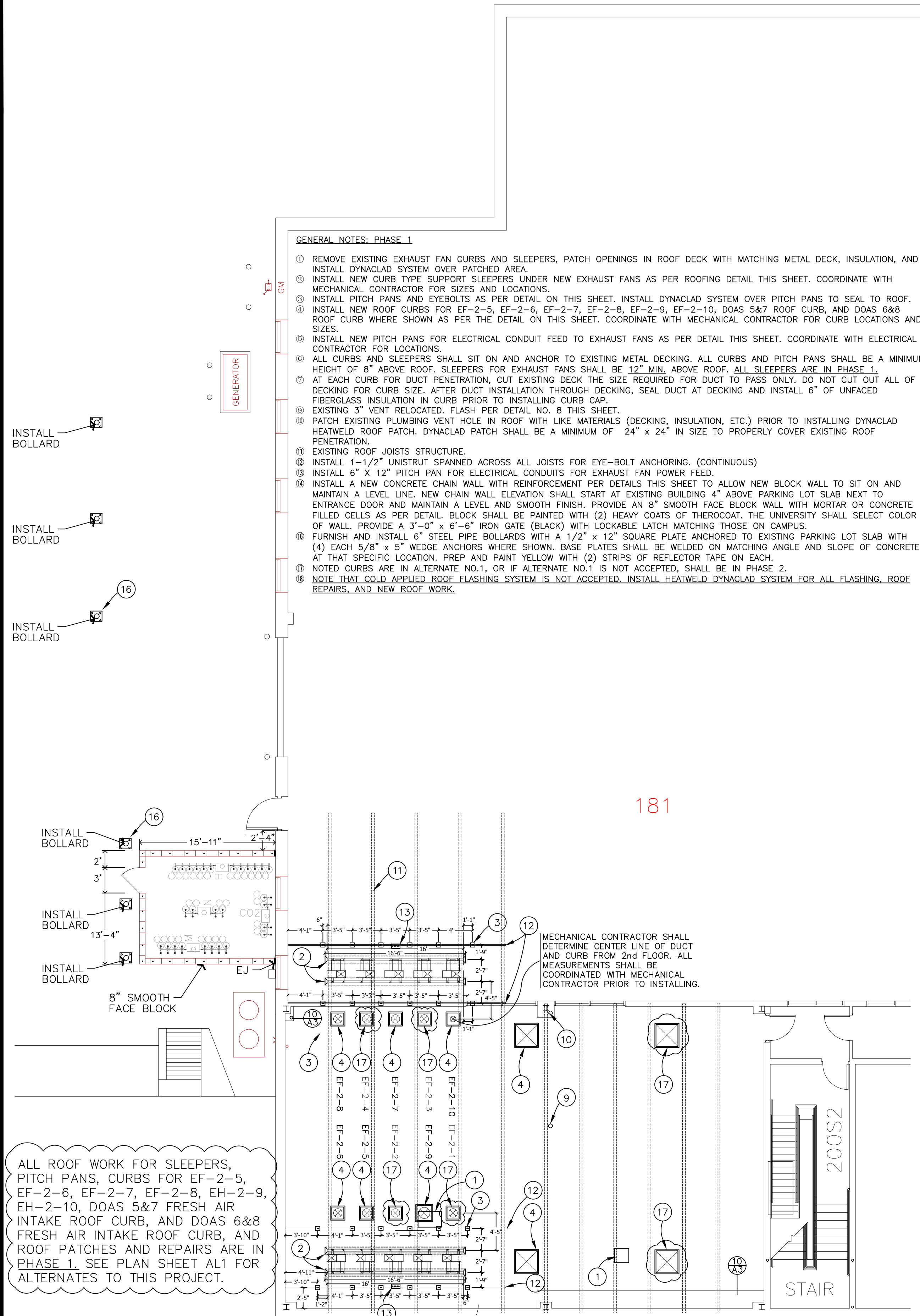
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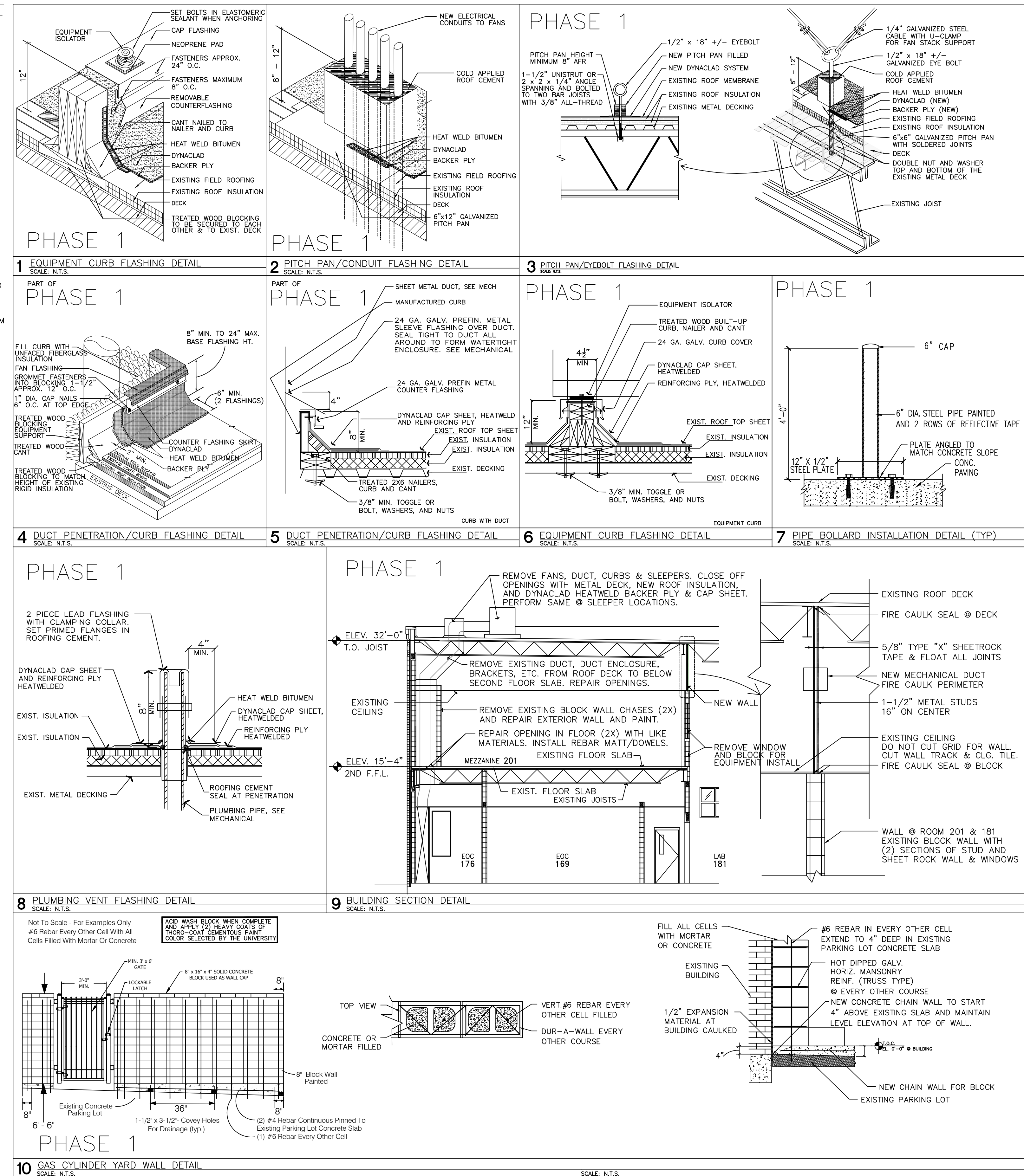
PHASE 1

PROJECT NO:	SHEET:
DATE: APRIL 2022	A2
SCALE: 1/4" = 1' - 0"	





PHASE 1



ROOFING AND EXTERIOR WORK DETAIL PLAN

GENERAL NOTES		
NO.	REVISIONS:	DATE:

# ABDALLA HALL ROOM 201 RENOVATIONS - PHASE 1

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PHASE 1

PROJECT NO:	SHEET:
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SCALE: 1" = 0"	



PLUMBING NOTES:

- ①

CONNECT TO EXISTING COLD WATER SUPPLY PIPING ABOVE 1ST LEVEL CEILING IN THIS VICINITY (AT EXISTING SHUT OF VALVE).
- ②

CONNECT TO EXISTING DOMESTIC HOT WATER SUPPLY PIPING ABOVE 1ST LEVEL CEILING IN THIS VICINITY. PROVIDE BALL TYPE SHUT OFF VALVE AT CONNECTION TO EXISTING HOT WATER PIPING NEAR EXISTING WATER HEATER.
- ③

EXTEND PIPING UP THROUGH SLAB TO SINK ABOVE. SEAL SLAB PENETRATION WITH FIRE RATED SEALANT. TYPICAL FOR ALL PENETRATIONS THROUGH FLOOR SLAB.
- ④

EXISTING ELECTRICAL CONDUIT TO REMAIN.
- ⑤

NEW 1" COMPRESSED AIR PIPING UP TO ROOM 201 ABOVE. EXTEND COMPRESSED AIR PIPING ABOVE 1ST LEVEL CEILING AND TURN TOWARD ROOM 177. ROUTE ABOVE EXISTING SUSPENDED CEILINGS IN ROOM 169 AND 178. ROUTE ALONG WALL, TURN AND PENETRATE INTERIOR WALL OF ROOM 177 AND TURN DOWN INTO SPACE. CONNECT TO AIR COMPRESSOR DRYER LOCATED IN ROOM 177. PROVIDE BALL TYPE SHUT VALVE AT DRYER.
- ⑥

CONNECT TO EXISTING VENT PIPING ABOVE 1ST LEVEL CEILING.
- ⑦

REFER TO DETAIL 3 ON SHEET P2 FOR PIPING CONNECTIONS TO FUME HOODS (TOTAL OF 4 FUME HOODS).
- ⑧

EXISTING EQUIPMENT TO REMAIN.
- ⑨

GAS MANIFOLD TANK YARD LOCATED ON FIRST LEVEL.
- ⑩

PHASE 1: HOODS 5, 6, 7, & 8 TO BE COMPLETELY INSTALLED IN PHASE 1 SCOPE OF WORK.  
PHASE 2: HOODS 1, 2, 3, & 4 SHALL BE RELOCATED AND FINAL CONNECTIONS COMPLETED IN PHASE 2 SCOPE OF WORK.
- ⑪

COMPRESSED AIR PIPING UP FROM BELOW. EXTEND TO EACH FUME HOOD. REFER TO DETAIL 3 ON SHEET P2 FOR PIPING CONNECTIONS TO FUME HOODS.
- ⑫

RELOCATE EXISTING 3" V.T.R. TO THIS LOCATION. PIPING MAY BE SCHEDULE 40 PVC WRAPPED WITH 2" FIBERGLASS INSULATION WITH FOIL BACKED VAPOR BARRIER. SEAL ALL JOINTS AND SEAMS IN INSULATION.
- ⑬

REFER TO SECOND FLOOR PLAN ON THIS SHEET FOR CONTINUATION.
- ⑭

REFER TO FIRST FLOOR PLAN ON THIS SHEET FOR CONTINUATION.
- ⑮

1" METHANE (M), 1" NITROGEN (N), 1" CARBON DIOXIDE (CO2), AND 1" HYDROGEN (H) PIPING FROM TANK MANIFOLDS. EXTEND THROUGH EXTERIOR WALL. SLEEVE PIPING THROUGH WALL (14"A.F.F.). PROVIDE WATER TIGHT SEAL (INSIDE AND OUTSIDE WALL) AT WALL PENETRATION. EXTEND UP ALONG WALL TO BELOW CEILING LEVEL AND BELOW UPPER WINDOW IN ROOM 181. ALL PIPING SUPPORTS AND PIPE CLAMPS SHALL HAVE RUBBERIZED COVERING BETWEEN PIPE AND PIPE CLAMP(S). INSTALLATION OF GAS PIPING SHALL BE PERFORMED BY A CONTRACTOR WITH AN ACTIVE CERTIFICATION AND PREVIOUS EXPERIENCE FOR INSTALLATION OF SPECIALTY GAS PIPING SYSTEMS. PIPING SHALL BE PURGED WITH NITROGEN WHILE SOLDERING AS REQUIRED BY CODE. GAS PIPING (M, H, & CO2) SHALL BE STAINLESS STEEL. "SWAGelok" TYPE FITTINGS MAY BE USED. GAS PIPING (N & A) MAY BE CLEAN TYPE "L" COPPER. INSTALL ALL PIPING PER MANUFACTURE'S RECOMMENDATIONS. ALL PIPING SHALL BE PROPERLY LABELED. LABELS SHALL BE APPLIED TO PIPING AT INTERVALS OF 8'-0" ON CENTER (MINIMUM). LABELS SHALL BE VISIBLE FROM FLOOR LEVEL.

- ⑯

"REXARC" MANIFOLD CONTROL PANEL WITH GAS MANIFOLD PIPING TO GAS TANKS. NEW TANK MANIFOLD SHALL BE SIMILAR TO MADISON HALL WITH ADDITIONAL ISOLATION VALVES FOR ADDITIONAL TANKS ON EACH CONTROL PANEL.  

METHANE:

PROVIDE 16 VALVES (8 PER SIDE).

HYDROGEN:

PROVIDE 24 VALVES (12 PER SIDE).

NITROGEN:

PROVIDE 8 VALVES (4 PER SIDE).

CO2:

PROVIDE 8 VALVES (4 PER SIDE).
- ⑰

EXISTING PIPING TO REMAIN.
- ⑱

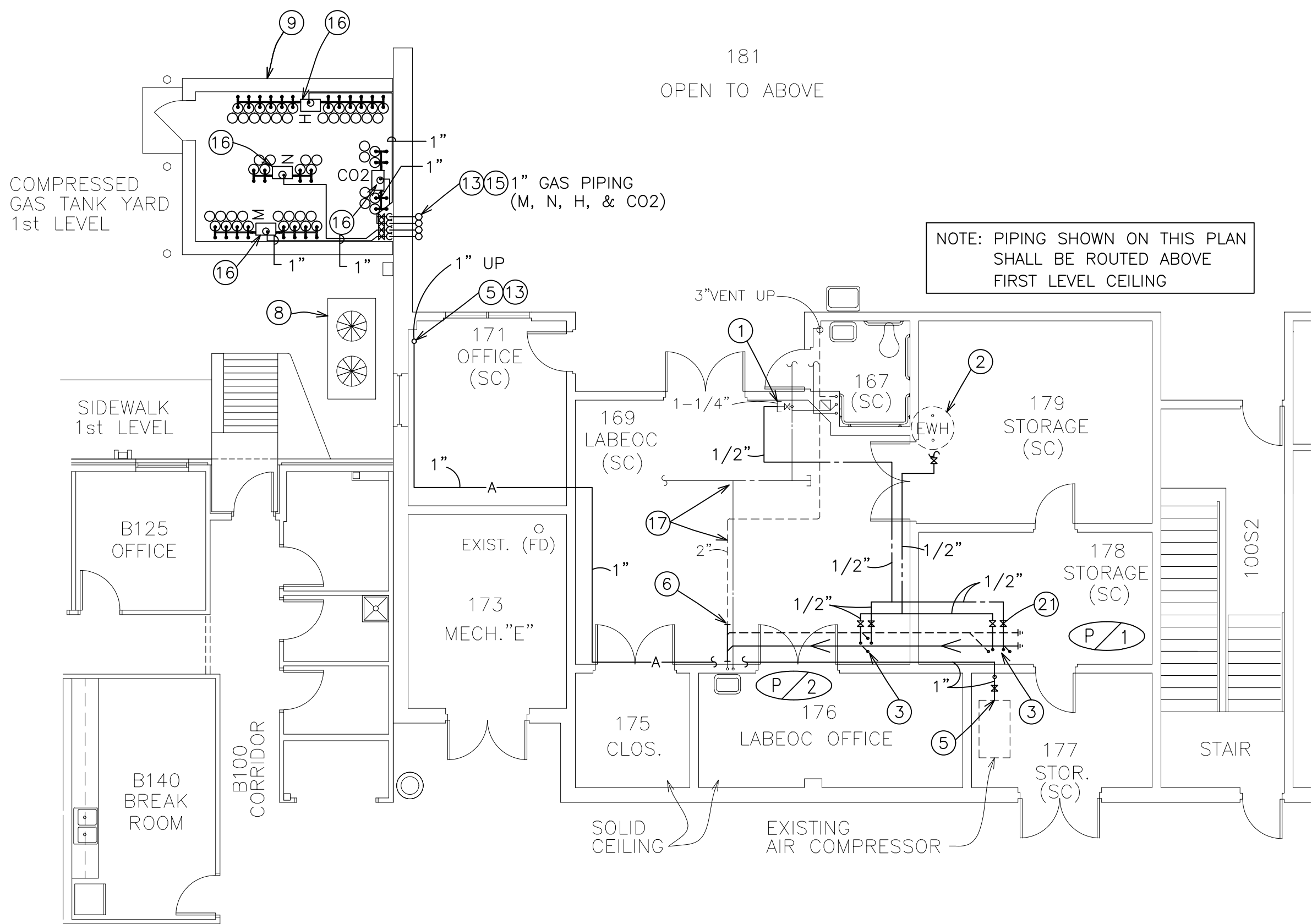
PROVIDE BALL TYPE ISOLATION VALVE AT EXTERIOR WALL (ONE PER GAS TYPE - TYPICAL OF 4).
- ⑲

VALVE AND CAP PIPING FOR FUTURE EXTENSION TO FUME HOODS 1, 2, 3, & 4.
- ⑳

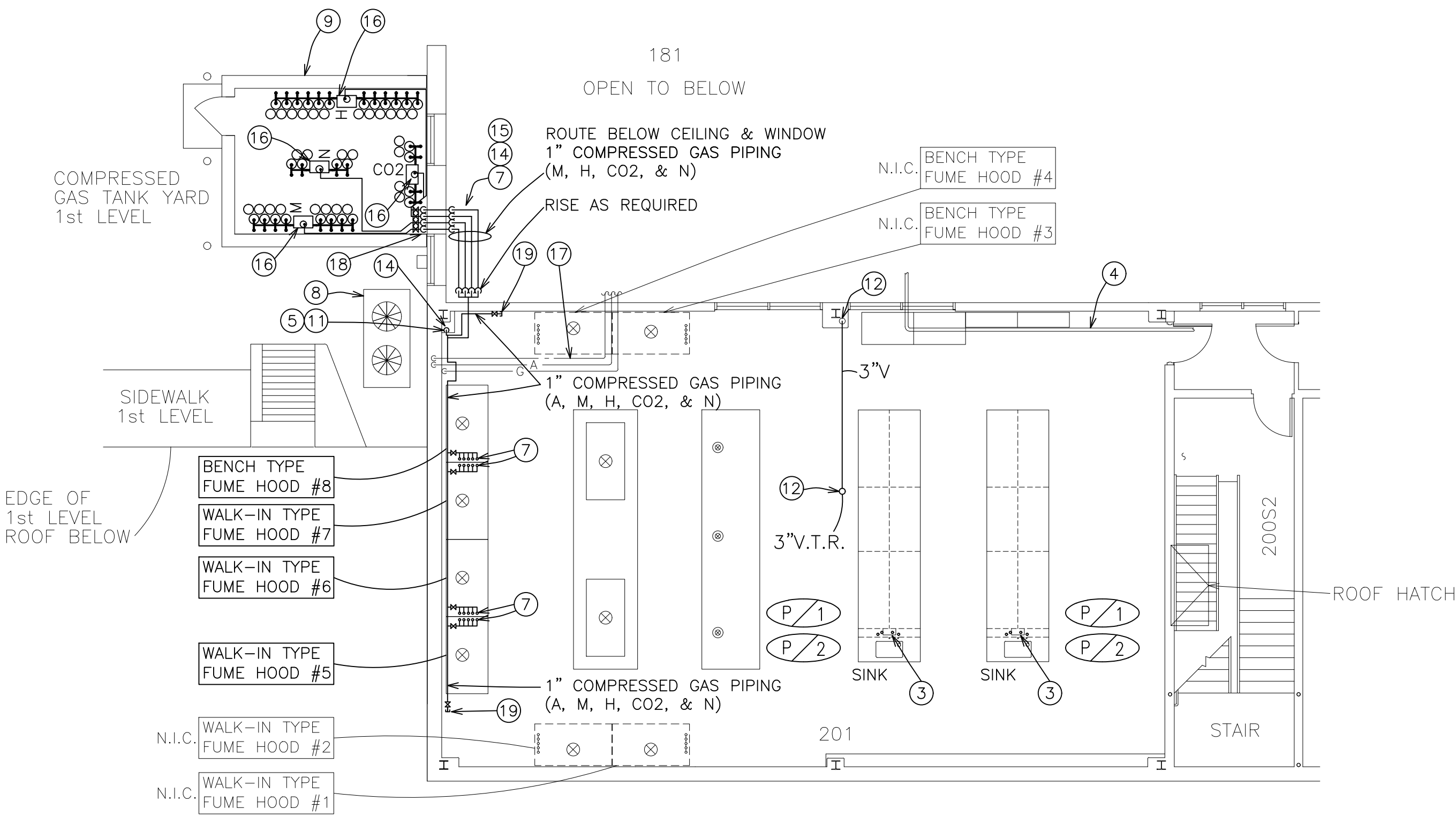
SEAL ALL PIPE PENETRATIONS THRU WALL BETWEEN 201 & 181 WITH FIRE RATED SEALANT.
- ㉑

BALL TYPE SHUT-OFF VALVE ABOVE FIRST LEVEL CEILING (TYPICAL).

NOTE:  
PHASE 1: SCOPE OF WORK ASSOCIATED WITH PHASE 1 SHALL INCLUDE ALL WORK SHOWN ON PLANS.  
INSTALL SHUT-OFF VALVES AND CAP COMPRESSED GAS PIPING FOR FUTURE EXTENSION TO FUME HOODS 1, 2, 3, & 4.  
HOODS 5, 6, 7, & 8 SHALL BE COMPLETELY OPERABLE.



ABDALLA HALL  
PARTIAL FIRST FLOOR PLAN  
MECHANICAL PIPING PLAN



ABDALLA HALL - ROOM 201  
PARTIAL SECOND FLOOR PLAN  
MECHANICAL PIPING PLAN

PLUMBING & PIPING PLAN

GENERAL NOTES		
NO:	REVISIONS:	DATE:

ABDALLA HALL  
ROOM 201 RENOVATIONS - PHASE 1

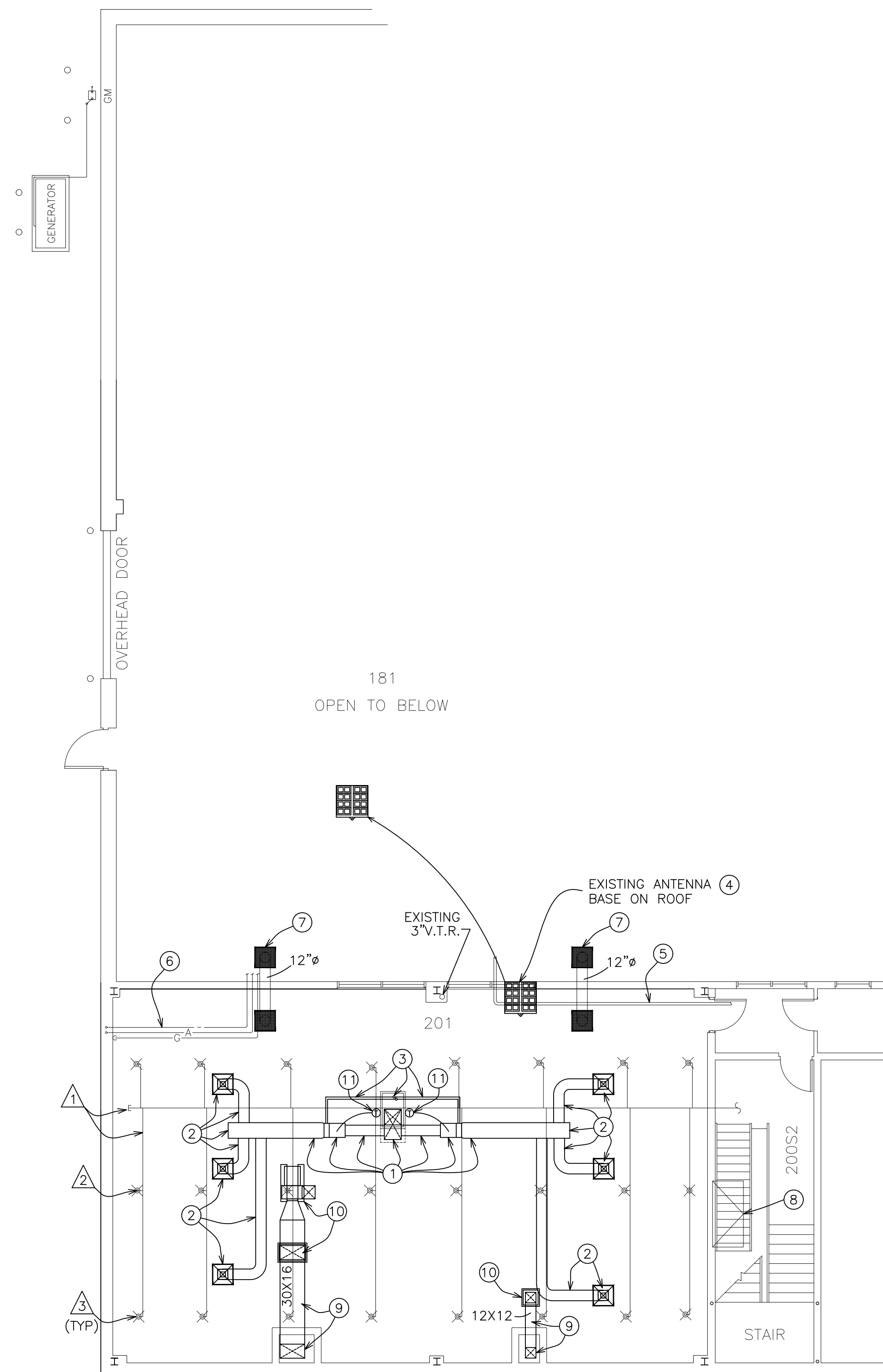
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PHASE 1

PROJECT NO:	SHEET:
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SCALE:	





ABDALLA HALL – ROOM 201  
PARTIAL SECOND FLOOR PLAN  
DEMOLITION – MECHANICAL PLAN

## ABDALLA HALL ROOM 201

### MECHANICAL DEMOLITION NOTES:

- ① – REMOVE EXISTING VAV BOX, AND DUCTWORK ABOVE CEILING. REMOVE SUPPLY DUCT DOWN IN CHASE. CAP SUPPLY DUCT AT MAIN DUCT CONNECTION ABOVE 1ST FLOOR CEILING. PROVIDE AIR TIGHT DUCT PATCH. INSULATE PATCH WITH 2" THICK FIBERGLASS DUCT WRAP WITH FOIL VAPOR BARRIER. SEAL ALL SEAMS WITH HIGH QUALITY FOIL BACKED SEALING TAPE.
- ② – REMOVE DUCT DOWN STREAM OF VAV BOX, BRANCH DUCTS, AND CEILING MOUNTED SUPPLY GRILLES.
- ③ – REMOVE HOT WATER PIPING FROM VAV BOX, PIPING ABOVE 2ND LEVEL CEILING, AND PIPING IN CHASE. CAP PIPING ABOVE 1ST LEVEL CEILING. COORDINATE DRAIN DOWN AND REFILLING OF HVAC HOT WATER SYSTEM WITH OWNER. REMOVE ALL AIR FROM PIPING SYSTEM UPON REFILLING OF HVAC HOT WATER SYSTEM.
- ④ – RELOCATE ANTENNA WITH BASE AS REQUIRES TO ACCOMMODATE INSTALLATION OF NEW EXHAUST FANS ON ROOF. COORDINATE RELOCATION WITH OWNER.
- ⑤ – EXISTING ELECTRICAL CONDUIT TO REMAIN.
- ⑥ – EXISTING GAS, WATER, AND AIR PIPING TO REMAIN.
- ⑦ – EXISTING "HOP OVER" RETURN AIR GRILLES TO BE SALVAGED AND REUSED. CONNECTING DUCT TO BE REMOVED. GRILLES SHALL BE RELOCATED. SALVAGE CEILING TILES TO REPLACE GRILLE LOCATIONS.
- ⑧ – EXISTING ROOF HATCH TO REMAIN.
- ⑨ – EXISTING EXHAUST DUCT ABOVE CEILING, DOWN IN CHASE AND ABOVE 1ST FLOOR CEILING SHALL BE REMOVED. COORDINATE CUTTING AND PATCHING WITH GENERAL CONTRACTOR TO ACCOMMODATE COMPLETE REMOVAL OF DUCTWORK.
- ⑩ – REMOVE EXISTING EXHAUST FAN AND DUCTWORK THROUGH AND/OR ABOVE ROOF. COORDINATE REMOVAL OF EXISTING ROOF CURBS WITH GENERAL CONTRACTOR.
- ⑪ – REMOVE THERMOSTATS AND ASSOCIATED CONTROLS FOR VAV BOXES. REVISE CONTROLS GRAPHICS AT FRONT END AT PARKER HALL.

### SPRINKLER NOTES:

- △ – EXISTING SPRINKLER PIPING TO REMAIN. (TYPICAL).
- △ – EXISTING SPRINKLER HEAD TO REMAIN. (TYPICAL).
- △ – SPRINKLER CONTRACTOR SHALL COORDINATE WITH GENERAL CONTRACTOR TO PROPERLY ADJUST ALL EXISTING SPRINKLER HEADS IN ROOM 201 AS REQUIRED TO ACCOMMODATE NEW CEILING TILES, ETC.

GENERAL NOTES		
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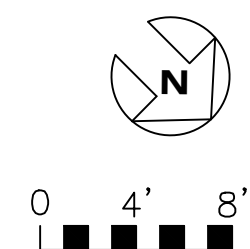
## ABDALLA HALL ROOM 201 RENOVATIONS - PHASE 1

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## PHASE 1

PROJECT NO:	SHEET:
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## DEMOLITION – MECHANICAL PLAN

MECHANICAL NOTES:

- ⑩ – 24"x24" GRILLES TO BE RELOCATED TO THIS LOCATION. REMOVE HOP OVER DUCT BETWEEN GRILLES.
- ⑪ – LABEL EXHAUST FAN DISCONNECT SWITCH ON ROOF WITH RESPECTIVE FAN NO. AND HOOD NO.. LABEL DISCONNECTS FOR ALL FANS WITH VFD'S (TOTAL OF 6) TO "TURN OFF VFD IN ROOM 201 PRIOR TO DISENGAGING DISCONNECT".
- ⑫ – LABEL VFD'S AND STARTER WITH RESPECTIVE FAN NO. AND HOOD NO. LABEL VFD'S AND STARTER WITH FINAL BALANCED AIRFLOW SETTING (EX. – 1280 CFM, 825 CFM, ETC.) AND VFD SPEED SETTING (EX. – XX HZ OR % SPEED).
- ⑬ – LABEL CANOPY HOOD AND SNORKEL FAN ON/OFF SWITCHES ON WALL (EX.: EF-9 "CANOPY HOODS", EF-10 "SNORKELS")
- ⑭ – RELOCATE ROOM PRESSURE MONITOR DEVICES FROM MADISON 112 AND RE-INSTALL IN ROOM 201. COMPLETE CONTROLS INTERLOCK PER CONTROLS SEQUENCE OF OPERATION IN SPECIFICATIONS. COORDINATE POWER REQUIREMENTS AND CONTROLS REQUIREMENTS WITH THE ELECTRICAL AND CONTROLS CONTRACTORS. (PHASE 2 WORK – NOT IN PHASE 1 SCOPE OF WORK)
- ⑮ – RELOCATE GAS MONITOR FROM MADISON 112 AND RE-INSTALL IN ROOM 201. COMPLETE CONTROLS INTERLOCK PER CONTROLS SEQUENCE OF OPERATION IN SPECIFICATIONS. COORDINATE POWER REQUIREMENTS AND CONTROLS REQUIREMENTS WITH THE ELECTRICAL AND CONTROLS CONTRACTORS. (PHASE 2 WORK – NOT IN PHASE 1 SCOPE OF WORK)



MECHANICAL PLAN

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ROOM 201 RENOVATIONS - PHASE 1

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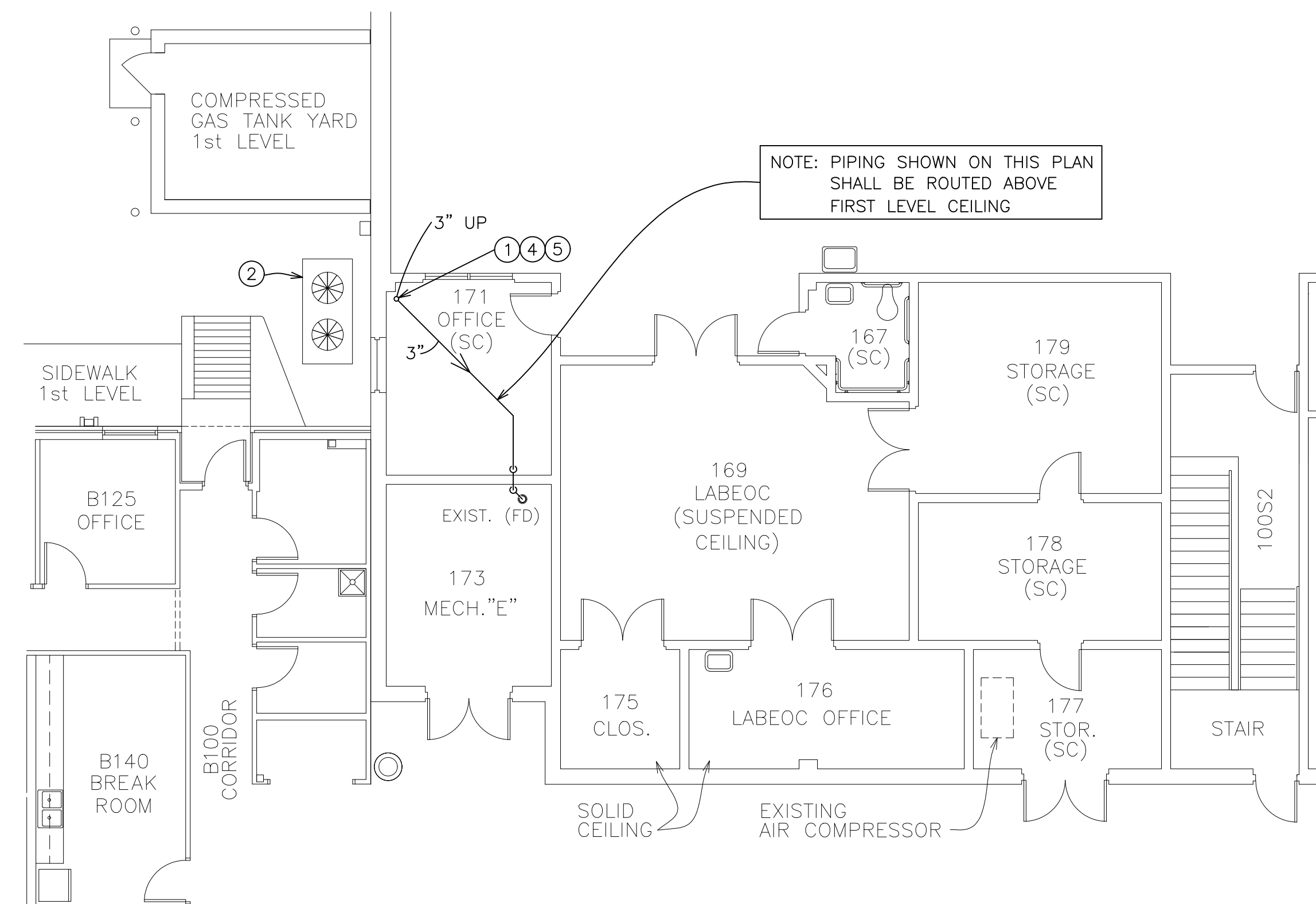


## PHASE 1

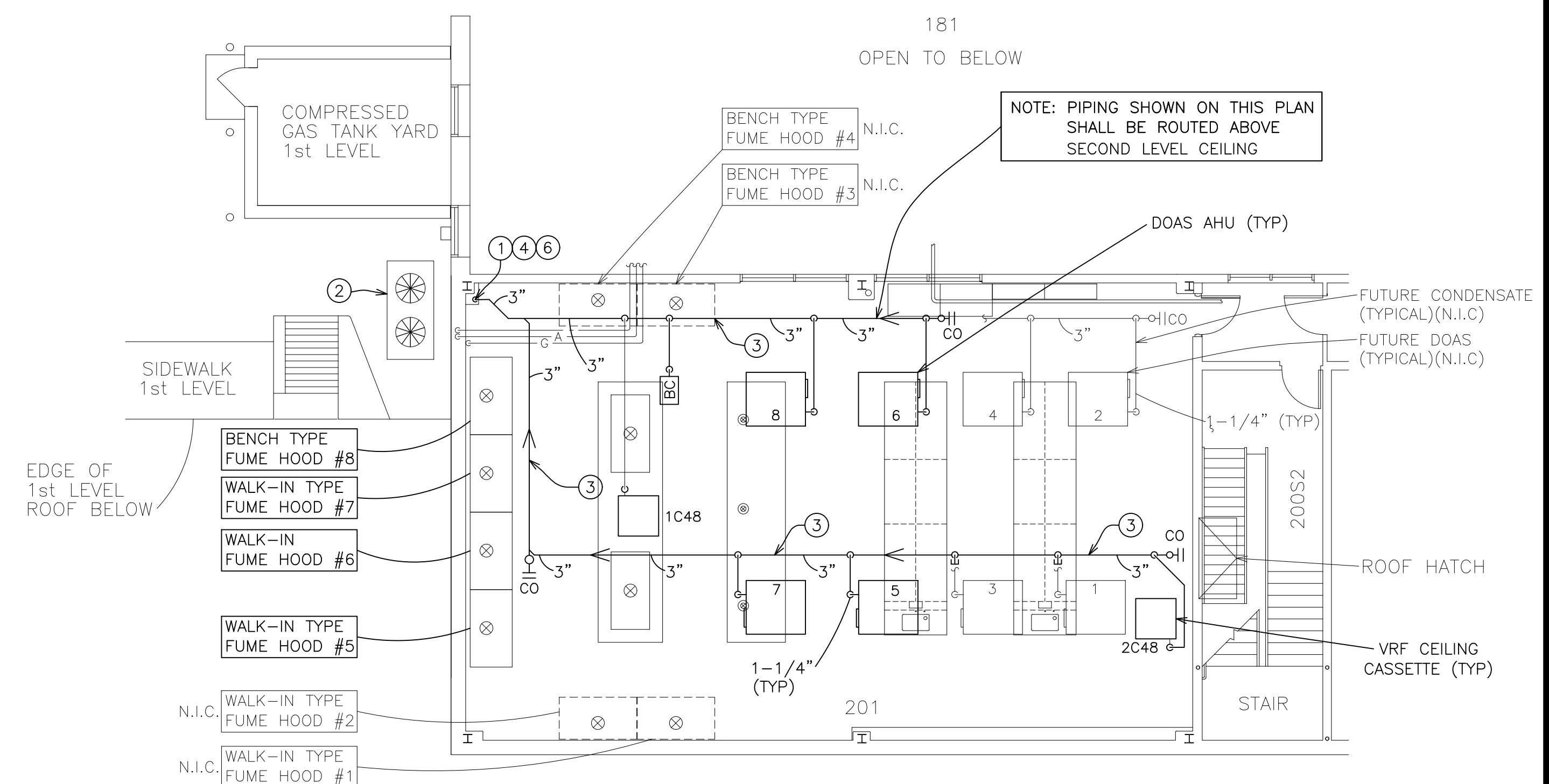
PROJECT NO:	SHEET:
DATE: APRIL 2022	M2
SCALE:	



- ① - ROUTE 3" CONDENSATE DRAIN LINE DOWN THRU 2ND LEVEL SLAB. TURN ABOVE ABOVE 1ST LEVEL CEILING. ROUTE OVER TO EXISTING MECHANICAL ROOM AND PENETRATE WALL. TURN DOWN AND ROUTE ALONG INTERIOR WALL TO FLOOR LEVEL. TURN AND ROUTE TO EXISTING FLOOR DRAIN. TERMINATE CONDENSATE DRAIN LINE AT EXISTING FLOOR DRAIN. OFFSET AS REQUIRED TO ACCOMMODATE EXISTING DUCTWORK, ETC. PROVIDE THREADED CLEANOUT PLUGS AT ALL 90 DEGREE TURNS. SEAL PENETRATIONS THRU FLOOR SLAB WITH FIRE RATED SEALANT.
- ② - EXISTING EQUIPMENT TO REMAIN.
- ③ - CONDENSATE DRAIN PIPING ROUTED ABOVE 2ND LEVEL CEILING.
- ④ - CONDENSATE DRAIN PIPING DOWN TOO ABOVE 1ST LEVEL CEILING.
- ⑤ - REFER TO SECOND FLOOR PLAN ON THIS SHEET FOR CONTINUATION.
- ⑥ - REFER TO FIRST FLOOR PLAN ON THIS SHEET FOR CONTINUATION.
- ⑦ - CONDENSATE DRAIN LINE INSULATION SHALL BE COMPLETELY SEALED AT ALL SEAMS AND JOINTS.



ABDALLA HALL  
PARTIAL FIRST FLOOR PLAN  
MECHANICAL PIPING PLAN



ABDALLA HALL – ROOM 201  
PARTIAL SECOND FLOOR PLAN  
MECHANICAL PIPING PLAN

MECHANICAL PLAN

GENERAL NOTES		
NO:	REVISIONS:	DATE:

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ROOM 201 RENOVATIONS - PHASE 1

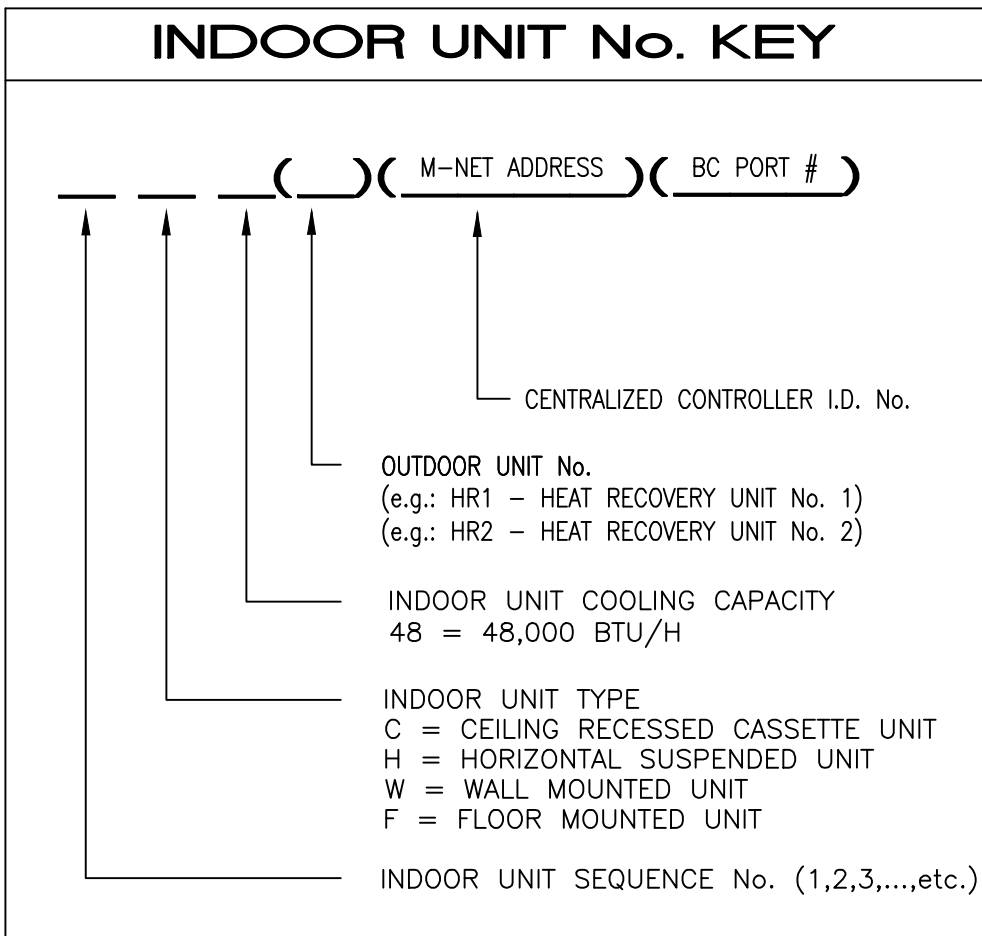
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FACILITY MANAGEMENT  
FILE NO: 13083 ABD. (201 RENO).DWG

## PHASE 1

PROJECT NO:	SHEET:
DATE: APRIL 2022	M3
SCALE:	



VARIABLE REFRIGERANT FLOW (VRF) - HEAT RECOVERY - INDOOR UNIT SCHEDULE																	
UNIT NO.	SERVICE	BC CONTROLLER CONNECTION	FAN CFM		COOLING			HEATING		ELECTRICAL SERVICE	FLA/MCA	SOUND LEVEL dB(A)		UNIT CONTROL TSTAT OR INTERNAL SENSOR	COMMENTS		
			HIGH	LOW	MIN. BTU/H OUTPUT	EAT (°F) DB	WB	MIN. BTU/H OUTPUT	INDOOR TEMP.			HIGH	LOW				
PHASE 1	1C48(2-1)(1)(1)	ABDALLA HALL - ROOM 201	BC-2-1	1236	777	48,000	80	67	54,000	70°F D.B.	208-1-60	1.01/1.27	45	36	INTERNAL SENSOR	MITSUBISHI PLFY-EP48NEMU-ER1 (3X3 CEILING RECESSED CASSETTE UNIT)	
PHASE 1	2C48(2-1)(2)(2)	ABDALLA HALL - ROOM 201	BC-2-1	1236	777	48,000	80	67	54,000	70°F D.B.	208-1-60	1.01/1.27	45	36	INTERNAL SENSOR	MITSUBISHI PLFY-EP48NEMU-ER1 (3X3 CEILING RECESSED CASSETTE UNIT)	

- NOTE:
1. ALL UNITS SHALL BE COMPLETE WITH STOP VALVE WITH SERVICE PORT ON LIQUID, GAS AND RECOVERY LINES. VALVES SHALL BE LOCATED SUCH THAT UNIT CAN BE REMOVED AND REPLACED WITHOUT SHUTTING DOWN THE ENTIRE SYSTEM.
  2. CEILING RECESSED UNITS (ONE-WAY AND FOUR-WAY) SHALL BE PROVIDED WITH INTEGRAL CONDENSATE PUMP.
  3. UNIT CONTROL: WALL MOUNTED CONTROLLER (WIRED REMOTE WALL MOUNTED CONTROLLER WITH INTERNAL TEMPERATURE SENSOR) OR UNIT'S INTERNAL SENSOR (NO WALL MOUNTED CONTROLLER, TEMPERATURE SENSED AT RETURN SENSOR). REFER TO PLANS FOR QUANTITY OF WALL MOUNTED CONTROLLERS REQUIRED AS SOME UNITS SHARE A WALL MOUNTED CONTROLLER.
  4. UNIT SHALL BE PROVIDED WITH LONG LIFE FILTER IN UNIT. PROVIDE ONE (1) SPARE SET OF FILTERS WITH EACH INDOOR UNIT.
  5. ELECTRICAL DATA FOR BC CONTROLLER: BC CONTROLLER (CITY MULTI) = 1.89 AMPS.
  6. CONTRACTOR SHALL REMOVE PLASTIC CONDENSATE HOSE CLAMP (AT UNIT CONNECTION) ON EACH INDOOR UNIT. FURNISH AND INSTALL A STAINLESS STEEL HOSE CLAMP ON THE CONDENSATE DRAIN HOSE (AT THE UNIT CONNECTION) ON EACH INDOOR UNIT. THE STAINLESS STEEL HOSE CLAMP SHALL BE APPROPRIATELY SIZED TO CREATE A WATER TIGHT SEAL.
  7. ALL INDOOR UNITS SHALL HAVE AN IONIZATION DEVICE BY PLASMA AIR INSTALLED. DEVICES SHALL BE INSTALLED BY FACTORY REPRESENTATIVE.
  8. BC CONTROLLER PORT CONNECTION SHALL BE DETERMINED WHEN FINAL SHOP DRAWINGS ARE BEING PRODUCED.

VARIABLE REFRIGERANT FLOW (VRF) - HEAT RECOVERY - OUTDOOR UNIT SCHEDULE															
M-NET ADDRESS	ZONE NO.	UNIT NUMBER	SERVICE	COOLING		HEATING			ELECTRICAL SERVICE	REFRIGERANT	EER	SOUND LEVEL dB(A)	MCA (AMPS)	FUSE (AMPS)	COMMENTS
				MIN. BTUH OUTPUT	AMBIENT TEMP.	MIN. BTUH OUTPUT	INDOOR TEMP.	OUTDOOR D.B.°F W.B.°F							
PHASE 1	--	1	HR-2-1	ABDALLA HALL - ROOM 201	96,000	95°F	108,000	70°F 47°F 43°F	208-3-60	R-410A	12.1	60	31	45	MITSUBISHI CITY MULTI PURY-P96TNU-A (SIMULTANEOUS COOLING AND HEATING)

- NOTES:
1. MAXIMUM DISTANCE BETWEEN COMBINED UNITS ON ONE REFRIGERANT SYSTEM - 32 FEET.
  2. INSULATE SUCTION, LIQUID AND RECOVERY REFRIGERANT LINES.
  3. INSTALL BC CONTROLLER (CITY-MULTI) FOR EACH CONDENSING UNIT AS REQUIRED BY MANUFACTURER'S SPECIFICATIONS CMB-P106NU-J1
  4. ALL UNITS SHALL BE COMPLETE WITH STOP VALVE WITH SERVICE PORT ON LIQUID, GAS, AND RECOVERY LINES. VALVES SHALL BE LOCATED SUCH THAT UNIT CAN BE REMOVED AND REPLACED WITHOUT SHUTTING DOWN THE ENTIRE SYSTEM.
  5. INSTALLATION OF REFRIGERANT PIPING, CONTROL WIRING, POWER WIRING, ETC. SHALL BE INSTALLED PER MANUFACTURER'S RECOMMENDATIONS.
  6. EACH INDIVIDUAL OUTDOOR UNIT REQUIRES A DEDICATED ELECTRICAL CIRCUIT.
  7. ANCHOR UNITS TO VIBRATION ISOLATION SUPPORT. ANCHOR VIBRATION ISOLATION SUPPORT TO CONCRETE PAD.
  8. COORDINATE ELECTRICAL REQUIREMENTS WITH EQUIPMENT MANUFACTURER.

	M-NET ADDRESS	DEDICATED 100% OUTSIDE AIR - VARIABLE REFRIGERANT FLOW (VRF) - INDOOR UNIT SCHEDULE																	
		UNIT NO.	SERVICE	BC CONTROLLER	FAN		COOLING		HEATING			REHEAT	ELECTRICAL SERVICE	MCA/ MOP (AMPS)	SOUND LEVEL dB(A)		COMMENTS		
					CFM	E.S.P.	MIN. BTUH OUTPUT	EAT (°F)		MIN. BTUH OUTPUT	EAT (°F)				LAT (°F)	MIN. BTUH OUTPUT		HIGH	LOW
								DB	WB										
N.I.C.	--	DOAS-1	ABDALLA HALL - RM 201	BC-OA-1	1200	0.8	112,000	87	80	61,400	32	78	24,200	208-1-60	3.99/15	41	36	MITSUBISHI CITY MULTI PEFY-AF1200CFMR-E (DEDICATED OUTSIDE AIR UNIT WITH HOT GAS REHEAT)	
N.I.C.	--	DOAS-2	ABDALLA HALL - RM 201	BC-OA-2	1200	0.8	112,000	87	80	61,400	32	78	24,200	208-1-60	3.99/15	41	36	MITSUBISHI CITY MULTI PEFY-AF1200CFMR-E (DEDICATED OUTSIDE AIR UNIT WITH HOT GAS REHEAT)	
N.I.C.	--	DOAS-3	ABDALLA HALL - RM 201	BC-OA-3	1200	0.8	112,000	87	80	61,400	32	78	24,200	208-1-60	3.99/15	41	36	MITSUBISHI CITY MULTI PEFY-AF1200CFMR-E (DEDICATED OUTSIDE AIR UNIT WITH HOT GAS REHEAT)	
N.I.C.	--	DOAS-4	ABDALLA HALL - RM 201	BC-OA-4	1200	0.8	112,000	87	80	61,400	32	78	24,200	208-1-60	3.99/15	41	36	MITSUBISHI CITY MULTI PEFY-AF1200CFMR-E (DEDICATED OUTSIDE AIR UNIT WITH HOT GAS REHEAT)	
PHASE 1	--	DOAS-5	ABDALLA HALL - RM 201	BC-OA-5	1200	0.8	112,000	87	80	61,400	32	78	24,200	208-1-60	3.99/15	41	36	MITSUBISHI CITY MULTI PEFY-AF1200CFMR-E (DEDICATED OUTSIDE AIR UNIT WITH HOT GAS REHEAT)	
PHASE 1	--	DOAS-6	ABDALLA HALL - RM 201	BC-OA-6	1200	0.8	112,000	87	80	61,400	32	78	24,200	208-1-60	3.99/15	41	36	MITSUBISHI CITY MULTI PEFY-AF1200CFMR-E (DEDICATED OUTSIDE AIR UNIT WITH HOT GAS REHEAT)	
PHASE 1	--	DOAS-7	ABDALLA HALL - RM 201	BC-OA-7	1200	0.8	112,000	87	80	61,400	32	78	24,200	208-1-60	3.99/15	41	36	MITSUBISHI CITY MULTI PEFY-AF1200CFMR-E (DEDICATED OUTSIDE AIR UNIT WITH HOT GAS REHEAT)	
PHASE 1	--	DOAS-8	ABDALLA HALL - RM 201	BC-OA-8	1200	0.8	112,000	87	80	61,400	32	78	24,200	208-1-60	3.99/15	41	36	MITSUBISHI CITY MULTI PEFY-AF1200CFMR-E (DEDICATED OUTSIDE AIR UNIT WITH HOT GAS REHEAT)	

- NOTES:
1. ALL UNITS SHALL BE COMPLETE WITH STOP VALVE WITH SERVICE PORT ON LIQUID, GAS, AND RECOVERY LINES. VALVES SHALL BE LOCATED SUCH THAT THE UNIT CAN BE REMOVED AND REPLACED WITHOUT SHUTTING DOWN THE ENTIRE SYSTEM.
  2. UNIT SHALL BE PROVIDED WITH INTEGRAL CONDENSATE PUMP.
  3. ELECTRICAL DATA FOR BC CONTROLLERS: MCA = 0.85A
  4. UNIT L.A.T. AFTER HOT GAS REHEAT COIL SHALL BE NEUTRAL (±72° F ADJUSTABLE).

	M-NET ADDRESS	DEDICATED 100% OUTSIDE AIR - VARIABLE REFRIGERANT FLOW (VRF) - OUTDOOR UNIT SCHEDULE															
		UNIT NO.	SERVICE	COOLING		HEATING			OUTDOOR		ELECTRICAL SERVICE	REFRIGERANT	EER	CDU E.S.P.	SOUND LEVEL dB(A)	MCA/ FUSE SIZE (AMPS)	COMMENTS
				MIN. BTUH OUTPUT	AMBIENT TEMP.	MIN. BTUH OUTPUT	INDOOR TEMP.	D.B.°F	W.B.°F								
N.I.C.	--	CU-DOAS-1	ABDALLA HALL - RM 201	120,000	95°F	135,000	70°F	47	43	208/3/60	R-410A	12.1	0"	60	43.0/50.0	MITSUBISHI CITY MULTI PURY-P120TNU-A (HEAT RECOVERY) (NEW UNIT TO BE INSTALLED IN ABDALLA HALL RM 201)	
N.I.C.	--	CU-DOAS-2	ABDALLA HALL - RM 201	120,000	95°F	135,000	70°F	47	43	208/3/60	R-410A	12.1	0"	60	43.0/50.0	MITSUBISHI CITY MULTI PURY-P120TNU-A (HEAT RECOVERY) (NEW UNIT TO BE INSTALLED IN ABDALLA HALL RM 201)	
N.I.C.	--	CU-DOAS-3	ABDALLA HALL - RM 201	120,000	95°F	135,000	70°F	47	43	208/3/60	R-410A	12.1	0"	60	43.0/50.0	MITSUBISHI CITY MULTI PURY-P120TNU-A (HEAT RECOVERY) (NEW UNIT TO BE INSTALLED IN ABDALLA HALL RM 201)	
N.I.C.	--	CU-DOAS-4	ABDALLA HALL - RM 201	120,000	95°F	135,000	70°F	47	43	208/3/60	R-410A	12.1	0"	60	43.0/50.0	MITSUBISHI CITY MULTI PURY-P120TNU-A (HEAT RECOVERY) (NEW UNIT TO BE INSTALLED IN ABDALLA HALL RM 201)	
PHASE 1	--	CU-DOAS-5	ABDALLA HALL - RM 201	120,000	95°F	135,000	70°F	47	43	208/3/60	R-410A	12.1	0"	60	43.0/50.0	MITSUBISHI CITY MULTI PURY-P120TNU-A (HEAT RECOVERY) (NEW UNIT TO BE INSTALLED IN ABDALLA HALL RM 201)	
PHASE 1	--	CU-DOAS-6	ABDALLA HALL - RM 201	120,000	95°F	135,000	70°F	47	43	208/3/60	R-410A	12.1	0"	60	43.0/50.0	MITSUBISHI CITY MULTI PURY-P120TNU-A (HEAT RECOVERY) (NEW UNIT TO BE INSTALLED IN ABDALLA HALL RM 201)	
PHASE 1	--	CU-DOAS-7	ABDALLA HALL - RM 201	120,000	95°F	135,000	70°F	47	43	208/3/60	R-410A	12.1	0"	60	43.0/50.0	MITSUBISHI CITY MULTI PURY-P120TNU-A (HEAT RECOVERY) (NEW UNIT TO BE INSTALLED IN ABDALLA HALL RM 201)	
PHASE 1	--	CU-DOAS-8	ABDALLA HALL - RM 201	120,000	95°F	135,000	70°F	47	43	208/3/60	R-410A	12.1	0"	60	43.0/50.0	MITSUBISHI CITY MULTI PURY-P120TNU-A (HEAT RECOVERY) (NEW UNIT TO BE INSTALLED IN ABDALLA HALL RM 201)	

- NOTES:
1. INSULATE SUCTION, LIQUID AND RECOVERY REFRIGERANT LINES.
  2. INSTALL BC CONTROLLER ON EACH CONDENSING UNIT AS REQUIRED BY MANUFACTURER'S SPECIFICATIONS.
  3. ALL UNITS SHALL BE COMPLETE WITH STOP VALVE WITH SERVICE PORT ON LIQUID, GAS, AND RECOVERY LINES. VALVES SHALL BE LOCATED SUCH THAT THE UNIT CAN BE REMOVED AND REPLACED WITHOUT SHUTTING DOWN THE ENTIRE SYSTEM.
  4. MECHANICAL CONTRACTOR SHALL COORDINATE WITH ELECTRICAL CONTRACTOR ON MANUFACTURER SELECTED FOR THE PROJECT. INSTALLATION OF THE REFRIGERANT PIPING, CONTROL WIRING, POWER WIRING, ETC. SHALL BE INSTALLED PER MANUFACTURER'S RECOMMENDATIONS..
  5. ANCHOR UNITS TO VIBRATION ISOLATION SUPPORT AND ANCHOR ISOLATION SUPPORT TO CONCRETE PAD.

	FAN NO	FAN SCHEDULE											
		SERVICE	LOCATION	MIN. CFM	EXT. S.P.	RPM	HP	AMPS	TYPE	DRIVE	ELECTRIC SERVICE	CONTROL	COMMENTS
N.I.C.	EF-2-1	WALK-IN FUME HOOD #1	ABDALLA ROOM 201	1280	2.1"	2155	1	4.6	UTILITY	DIRECT	208/3/60	NEW VFD	COOK 120 CF-SWSI (NEW FAN INSTALLED AT ABDALLA HALL ROOM 201)
N.I.C.	EF-2-2	WALK-IN FUME HOOD #2	ABDALLA ROOM 201	1280	2.1"	2155	1	4.6	UTILITY	DIRECT	208/3/60	NEW VFD	COOK 120 CF-SWSI (NEW FAN INSTALLED AT ABDALLA HALL ROOM 201)
N.I.C.	EF-2-3	BENCH FUME HOOD #3	ABDALLA ROOM 201	825	2.0"	1971	1	4.6	UTILITY	DIRECT	208/3/60	NEW VFD	COOK 120 CF-SWSI (NEW FAN INSTALLED AT ABDALLA HALL ROOM 201)
N.I.C.	EF-2-4	BENCH FUME HOOD #4	ABDALLA ROOM 201	825	2.0"	1971	1	4.6	UTILITY	DIRECT	208/3/60	NEW VFD	COOK 120 CF-SWSI (NEW FAN INSTALLED AT ABDALLA HALL ROOM 201)
PHASE 1	EF-2-5	WALK-IN FUME HOOD #5	ABDALLA ROOM 201	1280	2.1"	2155	1	4.6	UTILITY	DIRECT	208/3/60	NEW VFD	COOK 120 CF-SWSI (NEW FAN INSTALLED AT ABDALLA HALL ROOM 201)
PHASE 1	EF-2-6	WALK-IN FUME HOOD #6	ABDALLA ROOM 201	1280	2.1"	2155	1	4.6	UTILITY	DIRECT	208/3/60	NEW VFD	COOK 120 CF-SWSI (NEW FAN INSTALLED AT ABDALLA HALL ROOM 201)
PHASE 1	EF-2-7	WALK-IN FUME HOOD #7	ABDALLA ROOM 201	1280	2.1"	2155	1	4.6	UTILITY	DIRECT	208/3/60	NEW VFD	COOK 120 CF-SWSI (NEW FAN INSTALLED AT ABDALLA HALL ROOM 201)
PHASE 1	EF-2-8	BENCH FUME HOOD #8	ABDALLA ROOM 201	825	2.0"	1971	1	4.6	UTILITY	DIRECT	208/3/60	NEW VFD	COOK 120 CF-SWSI (NEW FAN INSTALLED AT ABDALLA HALL ROOM 201)
PHASE 1	EF-2-9	2 CANOPY HOODS	ABDALLA ROOM 201	1600	1.5"	2218	1	4.6	UTILITY	DIRECT	208/3/60	NEW VFD	COOK 120 CF-SWSI (NEW FAN INSTALLED AT ABDALLA HALL ROOM 201)
PHASE 1	EF-2-10	3 SNORKELS	ABDALLA ROOM 201	300	2.0"	2551	1	6.2	UTILITY	DIRECT	208/1/60	ECM MOTOR NEW STARTER	COOK 70 CPV (VF)(NEW FAN INSTALLED AT ABDALLA HALL ROOM 201)

- NOTE:
1. FANS SHALL BE COMPLETE WITH TEFC MOTOR, ISOLATION RAIL (TO MATCH ROOF SLEEPERS), SPRING ISOLATORS, BACKDRAFT DAMPER, ADJUSTABLE DISCHARGE NOZZLE, STACK EXTENSION (68"), GUY WIRE TIR DOWNS, PREMIUM EFFICIENCY MOTORS, WEATHER COVER, PHENOLIC EPOXY W/UV (LIGHT GREY), S.S. HARDWARE, ETC.
  2. EF-2-9 SHALL BE INITIALLY BALANCED TO 1000 CFM (500 CFM PER CANOPY HOOD). VFD WILL BE USED TO INCREASE EXHAUST AIR FLOW RATE IF DESIRED BY OWNER.
  3. EF-2-10 SHALL USE THE ECM MOTOR FAN SPEED CONTROLLER TO ADJUST EXHAUST AIR FLOW (100 CFM PER SNORKEL) (IN LIEU OF VFD). A NEW STARTER SHALL BE USED FOR CONTROLS CONTACTS. FAN ISOLATION RAIL SHALL BE THE SAME SIZE AS OTHER NEW FANS TO ACCOMMODATE INSTALLATION ON ROOF SLEEPERS.
  4. COORDINATE INTERLOCK OF FUME HOOD FANS WITH RESPECTIVE DOAS UNITS. EF-2-9 & EF-2-10 SHALL HAVE ON/OFF CONTROL SWITCHES LOCATED ADJACENT TO VFD/STARTER LOCATIONS. (PHASE 2 - INTERLOCK THESE TWO FANS WITH ROOM PRESSURE MONITOR AND GAS MONITOR TO TURN ON IF EITHER MONITOR IS IN ALARM.)
  5. FANS WITH VFD CONTROL SHALL HAVE A PERMANENT LAMINATED PLATE SECURED TO THE ELECTRICAL DISCONNECT ON THE ROOF INDICATING "TURN OFF VFD IN ROOM 201 PRIOR TO TURNING OFF DISCONNECT SWITCH".

DIFFUSER / GRILLE SCHEDULE						
SYMBOL	SIZE	SERVICE	LOCATION	FINISH	O.B.D.	COMMENTS
A	6" x 6"	SUPPLY	CEILING	WHITE	O.B.D	TITUS TDC-AA-6-26-AG-95-AA, OR PRIOR APPROVED EQUAL.

NOTES: 1. REFER TO PLANS FOR BLOW PATTERN (e.g.: 1-WAY, 2-WAY, 3-WAY, OR 4-WAY) FOR EACH SUPPLY GRILLE.

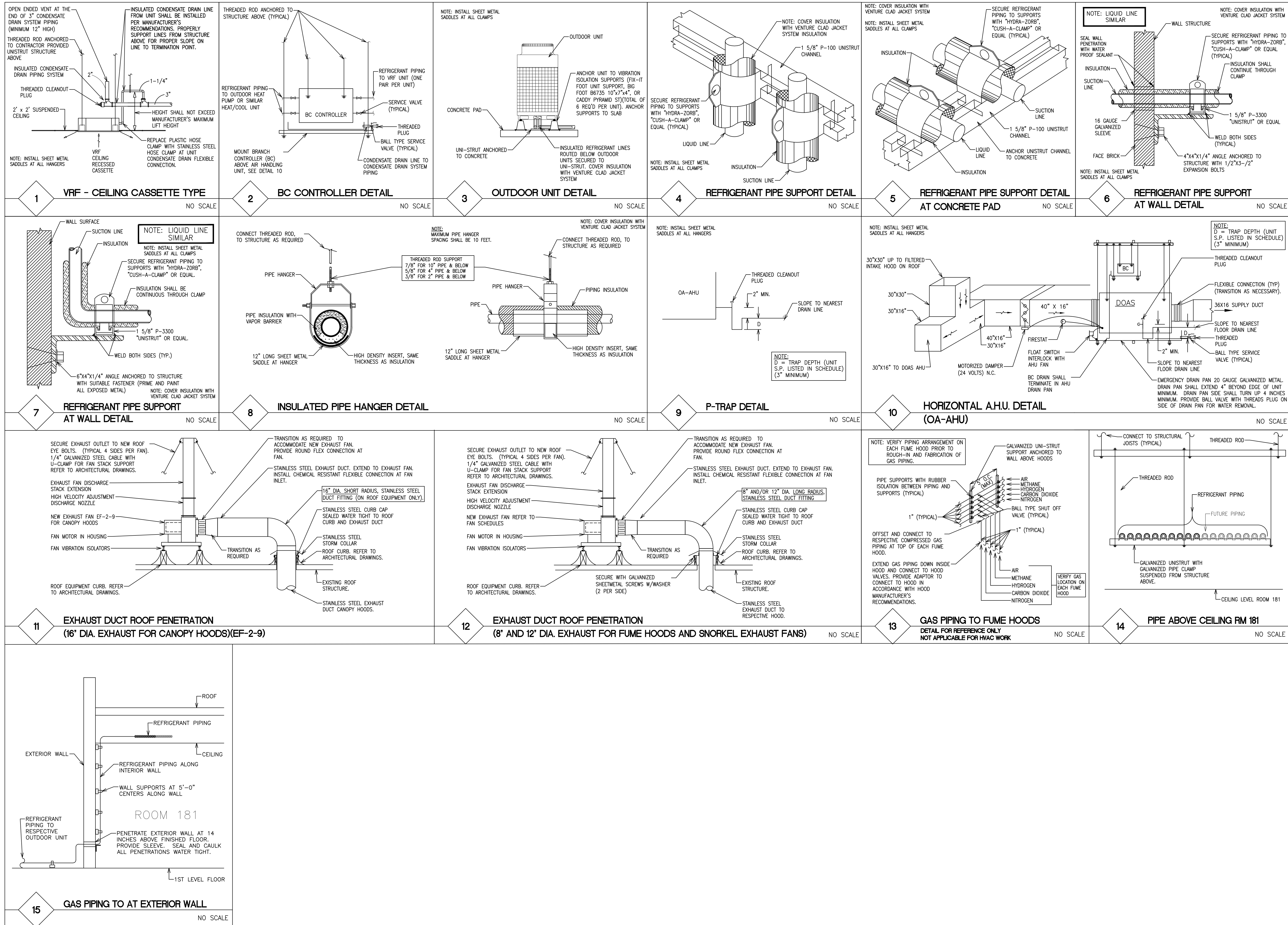
GENERAL NOTES		
NO:	REVISIONS:	DATE:

ABDALLA HALL  
ROOM 201 RENOVATIONS - PHASE 1

UL FACILITY MANAGEMENT  
THE UNIVERSITY OF LOUISIANA AT LAFAYETTE  
P.O. BOX 43646  
LAFAYETTE, LOUISIANA 70504

PHASE 1

PROJECT NO: SHEET:  
DATE: APRIL 2022  
SCALE: M4



GENERAL NOTES		
NO.	REVISIONS	DATE

ABDALLA HALL  
ROOM 201 RENOVATIONS - PHASE 1

UL FACILITY MANAGEMENT  
THE UNIVERSITY OF LOUISIANA AT LAFAYETTE  
P.O. BOX 43646  
LAFAYETTE, LOUISIANA 70504



PHASE 1

PROJECT NO:	SHEET:
DATE: APRIL 2022	M5
SCALE:	

MECHANICAL DETAILS

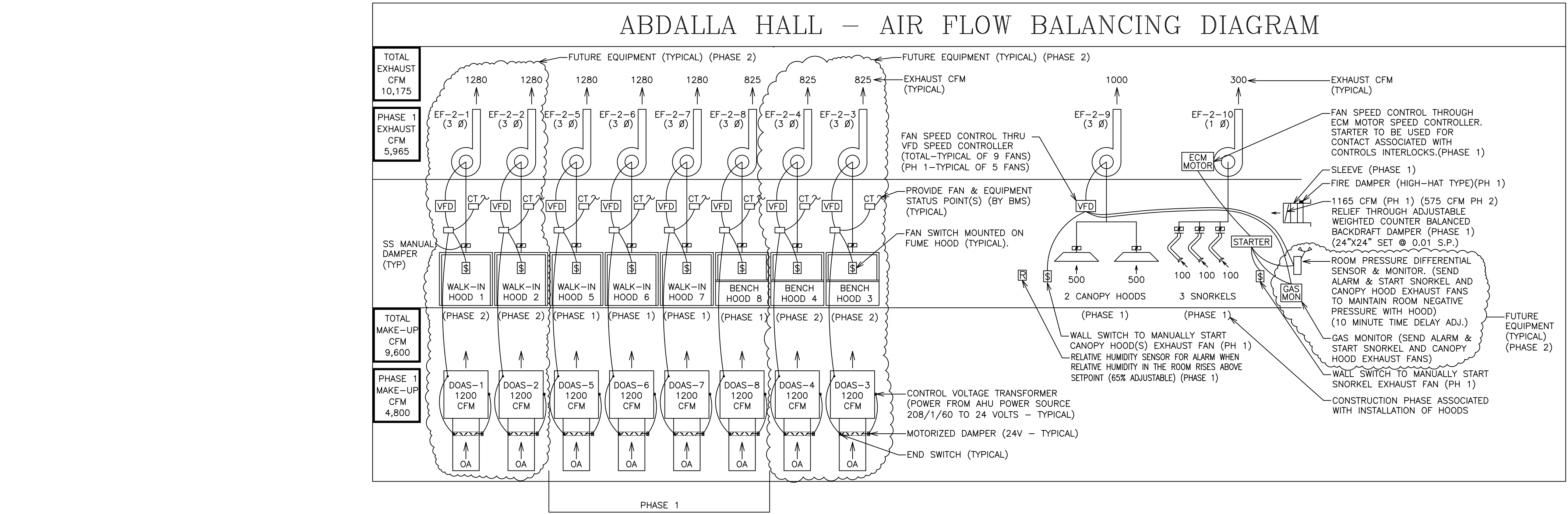


**PLAN VIEW**

NO SCALE

**ELEVATION VIEW**

NO SCALE



ABDALLA HALL  
ROOM 201 RENOVATIONS - PHASE 1



UNIVERSITY OF LOUISIANA AT LAFAYETTE  
FACILITY MANAGEMENT  
E NO: 13083 ABD. (201 RENO).DWG

PROJECT NO:	SHEET:  <b>M6</b>
DATE: APRIL 2022	
SCALE:	

## MECHANICAL DETAILS



- ③ ALL WORK SHALL BE BY A LICENSED AND/OR CERTIFIED ELECTRICIAN.
- ② OWNER RESERVES THE RIGHT TO REJECT ANY AND ALL UNQUALIFIED PERSONNEL ON THE PROJECT. ALL ELECTRICAL WORK SHALL BE EITHER COMPLETED BY OR INSPECTED BY A JOURNEYMAN ELECTRICIAN BEFORE ENERGIZING ANY CIRCUITS. NO WORK SHALL BE DONE ON LIVE ELECTRICAL CIRCUITS WITHOUT CONSENT OF THE OWNER. OWNER SHALL BE NOTIFIED TO COMPLETE ALL OPEN WALL OR ABOVE CEILING INSPECTIONS. ELECTRICAL CONTRACTOR SHALL BE EXPECTED TO FOLLOW THE UNIVERSITIES LOCK OUT PROCEDURE.
- ③ EXISTING 240/3/60 VOLT BUSS DUCT.
- ④ EXISTING 208/3/60 VOLT BUSS DUCT.
- ⑤ EXISTING 240/3/60 VOLT, 200 AMP, BUSS MOUNTED FUSIBLE DISCONNECT.
- ⑥ EXISTING 208/3/60 VOLT, 200 AMP, BUSS MOUNTED FUSIBLE DISCONNECT.
- ⑦ RELOCATE EXISTING 240 VOLT, 200 AMP BUSS DUCT FUSIBLE DISCONNECT WHERE SHOWN. PROVIDE REQUIRED FUSES IN DISCONNECT.
- ⑧ RELOCATE (2) EXISTING 208 VOLT, 200 AMP BUSS DUCT FUSIBLE DISCONNECT WHERE SHOWN. PROVIDE REQUIRED FUSES IN DISCONNECT.
- ⑨ FURNISH AND INSTALL A NEW NEMA-3R, 208/3/60 42 SPACE, PANEL BOARD WITH 200 AMP MAIN BREAKER (LABELED PANEL "LZ-B") ON UNISTRUT ON EXTERIOR WALL FOR NEW OA-HR CONDENSER UNITS WHERE SHOWN FED FROM EXISTING RELOCATED DISCONNECT ON BUSS DUCT. INSTALL (9) 50 AMP, 3-POLE BREAKERS, AS PER PANEL "LZ-B" SCHEDULE. RUN A 1" RIGID CONDUIT FROM PANEL "LZ-B" ON WALL THEN DOWN TO EACH UNIT, AND TURN UP INSIDE UNIT FROM BOTTOM PANEL OF UNIT. COORDINATE WITH MECHANICAL CONTRACTOR FOR ROUTING AND POSSIBLY UTILIZING PIPE SUPPORTS. RUN (3) #8L, (1) #8N, AND (1) #6G TO EACH UNIT IN PHASE 1. INSTALL A 120 VOLT RECEPTACLE BENEATH THE PANEL IN A WATERPROOF BOX. PROVIDE A 20 AMP BREAKER IN PANEL. PROVIDE ALL BREAKERS IN PANEL AS PER PANEL SCHEDULE IN PHASE 1. LABEL PANEL DIRECTORY.
- ⑩ FURNISH AND INSTALL A NEW NEMA-1, 208/3/60, 200 AMP, 84 SPACE SINGLE SECTION, RECESSED PANEL BOARD WITH 200 AMP MAIN BREAKER (LABELED PANEL "LZ") ON WALL WHERE SHOWN IN ROOM 201. PROVIDE ALL BREAKERS SHOWN ON PANEL SCHEDULE. LABEL PANEL DIRECTORY AS SUCH.
- ⑪ FURNISH AND INSTALL A NEMA-1, 240/3/60, 200 AMP, 84 SPACE SINGLE SECTION, RECESSED PANEL BOARD WITH 200 AMP MAIN BREAKER (LABELED PANEL "LZ-A") ON WALL WHERE SHOWN IN ROOM 201. PROVIDE ALL BREAKERS SHOWN ON PANEL SCHEDULE. LABEL PANEL DIRECTORY AS SUCH.

ABDALLA HALL  
ROOM 201 RENOVATIONS - PHASE 1

UL FACILITY MANAGEMENT  
THE UNIVERSITY OF LOUISIANA AT LAFAYETTE  
P.O. BOX 43646  
LAFAYETTE, LOUISIANA 70504

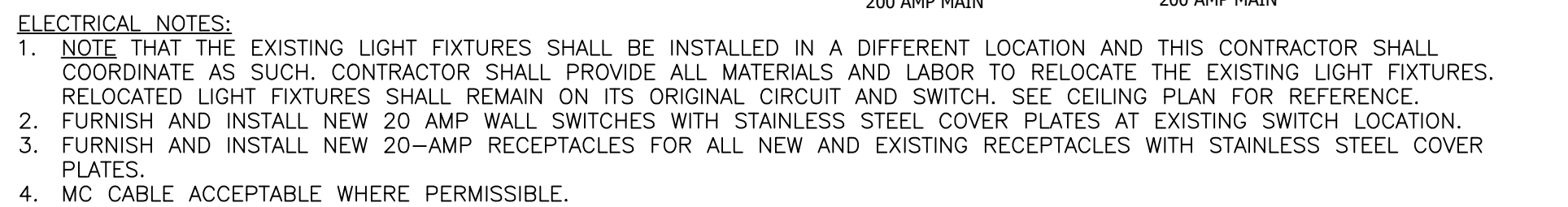


PROJECT NO:	SHEET:
DATE: APRIL 2022	H
SCALE: * = 1' - 0"	

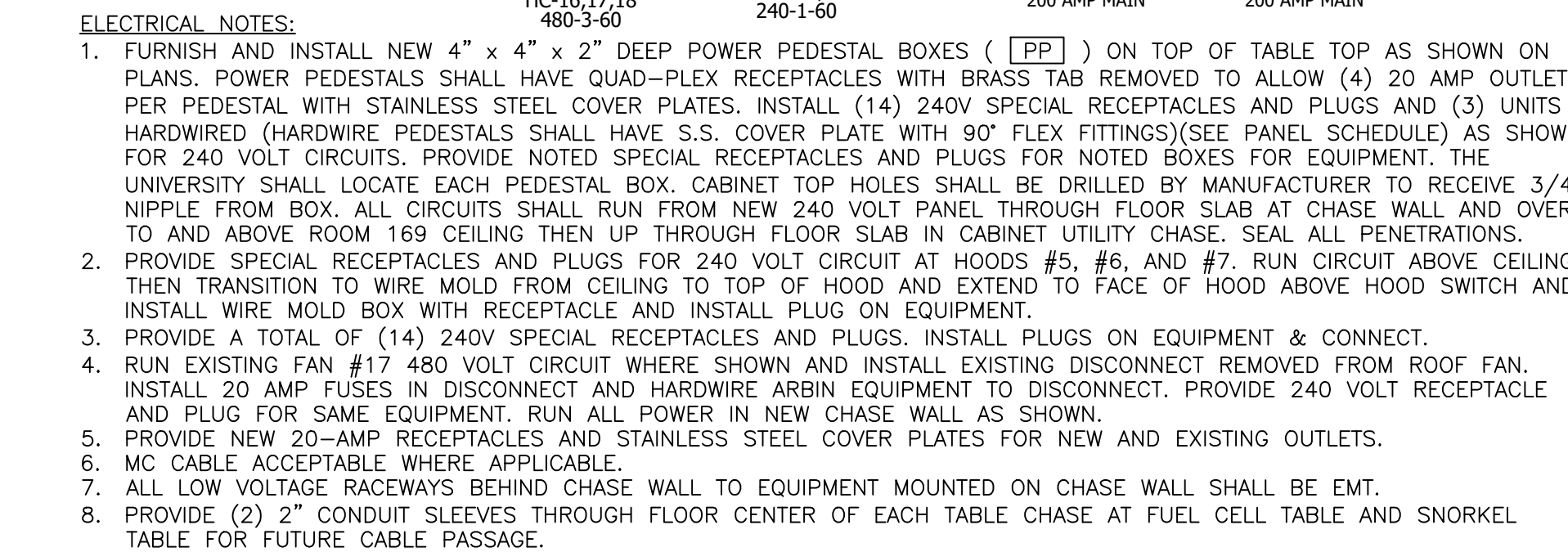
# E1

# ELECTRICAL PLAN





- ELECTRICAL NOTES:**
1. FURNISH AND INSTALL ALL WIRING, CONDUIT, AND NEW MOTOR RATED SWITCHES, SWITCHES REQUIRED FOR THAT VOLTAGE, AT DOAS UNITS DOAS 5, DOAS 6, DOAS 7, AND DOAS 8. DOAS 1, DOAS 2, DOAS 3, AND DOAS 4 ARE IN PHASE 2. RUN CONDUIT ONLY TO THESE.
  2. PROVIDE ONE (1) MOTOR RATED SWITCH FOR EACH DOAS UNIT AND ONE (1) FOR EACH BC UNIT. CONNECT TO NEW CIRCUIT IN PANEL "L2" AS SHOWN ON PANEL SCHEDULE. PROVIDE A "JP" (JUNCTION BOX WITH 208/1/60 #8AWG CIRCUIT WIRING FOR AHU MANUFACTURER SUPPLIED TRANSFORMER) ADJACENT TO MOTOR RATED SWITCHES. TRANSFORMER INSTALLED BY OTHERS.
  3. MC CABLE IS ACCEPTABLE WHERE APPLICABLE.

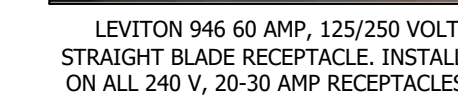
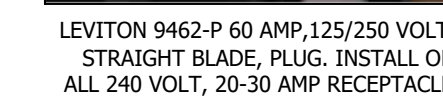
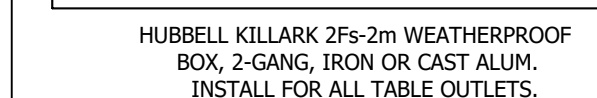
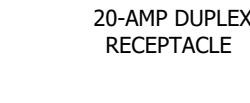


201

ALL WORK SHALL BE BY A LICENSED AND/OR CERTIFIED ELECTRICIAN.

OWNER RESERVES THE RIGHT TO REJECT ANY AND ALL UNQUALIFIED PERSONNEL ON THE PROJECT. ALL ELECTRICAL WORK SHALL BE EITHER COMPLETED BY OR INSPECTED BY A JOURNEYMAN ELECTRICIAN BEFORE ENERGIZING ANY CIRCUITS. NO WORK SHALL BE DONE ON LIVE ELECTRICAL CIRCUITS WITHOUT CONSENT OF THE OWNER. OWNER SHALL BE NOTIFIED TO COMPLETE ALL OPEN WALL OR ABOVE CEILING INSPECTIONS. ELECTRICAL CONTRACTOR SHALL BE EXPECTED TO FOLLOW THE UNIVERSITIES LOCK OUT PROCEDURE.

**PP** - POWER PEDISTAL ON TOP OF TABLE, 2-GANG, QUAD-PLEX RECEPTACLE  
REMOVE JUMPER TABS FOR INDIVIDUAL CIRCUITS FOR EACH OUTLET  
OR 240-1-60 WITH SPECIAL RECEPTACLE AND/OR HARD WIRED AS NOTED.



NEW FLOOR PLAN FOR REFERENCE

## PHASE 1 ELECTRICAL WORK

PHASE 1 ELECTRICAL CONSISTS OF:

- ① ALL ELECTRICAL WORK IN ROOM 201 BELOW CEILING, ABOVE CEILING, VFD's, AND NEW FANS ON ROOF RELATING TO FUME HOODS #5, #6, #7, #8, SNORKELS AND SNORKEL TABLE, AND CANOPY HOODS AND CANOPY HOOD TABLE IS IN PHASE 1.
- ② ALL CONDUIT IN WALLS, CHASES, AND TO ROOF IS IN PHASE 1.
- ③ PHASE 2 HOODS AND FANS ELECTRICAL WIRING AND DISCONNECTS ARE IN PHASE 2. ALL CONDUIT TO PHASE 2 EQUIPMENT IS IN PHASE 1. ALL CIRCUIT RACEWAYS FOR PHASE 2 HVAC EQUIPMENT FROM NEW ELECTRICAL PANELS SHALL BE EXTENDED TO EQUIPMENT LOCATION ABOVE CEILING FROM PANELS IN PHASE 1. RACEWAYS FOR ROOF EQUIPMENT SHALL RUN TO EQUIPMENT LOCATION ON ROOF.
- ④ ALL RACEWAYS TO AND FROM "J" BOXES FOR HVAC EQUIPMENT, ETC. ON CHASE WALL IS IN PHASE 1 OR AS NOTED ON PLANS.
- ⑤ WHERE PHASE 2 EQUIPMENT IS LOCATED ON WALLS, CONTRACTOR SHALL ROUGH-IN CONDUIT TO ALLOW ALL WALLS TO BE FINISHED AND PAINTED. ALL CONDUIT SHALL BE IN WALLS WITH THE EXCEPTION OF POWER FEED TO EQUIPMENT AT EXISTING BLOCK WALLS, THEN WIRE MOLD SHALL BE INSTALLED FOR EXPOSED RACEWAYS.



ELECTRICAL PLAN

[illegible]

ABDALLA HALL  
ROOM 201 RENOVATIONS - PHASE 1

UL FACILITY MANAGEMENT  
THE UNIVERSITY OF LOUISIANA AT LAFAYETTE  
P.O. BOX 43646  
LAFAYETTE, LOUISIANA 70504



## PHASE 1

PROJECT NO:	SHEET:  <b>E2</b>
DATE: APRIL 2022	
SCALE: 1" = 1' - 0"	



NOTE: ALL PANELS SHALL HAVE TWO GROUNDE BARS, ONE ISOLATED.

NEW ELECTRICAL SERVICE PANEL SCHEDULE										NEW ELECTRICAL SERVICE PANEL SCHEDULE									
PANEL: "LZ" 120/208V, 3Ø 4W - 2" COND. RECESSED NEMA-1 TYPE: PANELBOARD										PANEL: "LZ" 120/208V, 3Ø 4W - 2" COND. RECESSED NEMA-1 TYPE: PANELBOARD									
SINGLE SECTION										SINGLE SECTION									
200A MAIN BREAKER 10,000 AIC LOAD: 71.6 KW										200A MAIN BREAKER 10,000 AIC LOAD: 71.6 KW									
CKT	POLES	RATING	WIRE	MIN. COND.	USE	VOLTAGE	ROOM/EQUIPMENT			CKT	POLES	RATING	WIRE	MIN. COND.	USE	VOLTAGE	ROOM/EQUIPMENT		
1	3	20A	8AWG	3/4" COND. ROOF/RIGID	FAN 2-3	208V/3/60	VFD & DISCONNECT FOR EF/HOOD 3			2	3	20A	8AWG	3/4" COND. ROOF/RIGID	FAN 2-5	208V/3/60	VFD & DISCONNECT FOR EF/HOOD 5		
3										4									
7	3	20A	8AWG	3/4" COND. ROOF/RIGID	FAN 2-6	208V/3/60	VFD & DISCONNECT FOR EF/HOOD 6			8	3	20A	8AWG	3/4" COND. ROOF/RIGID	FAN 2-7	208V/3/60	VFD & DISCONNECT FOR EF/HOOD 7		
9										10									
11										12									
13	3	20A	8AWG	3/4" COND. ROOF/RIGID	FAN 2-8	208V/3/60	VFD & DISCONNECT FOR EF/HOOD 8			14	3	20A	8AWG	3/4" COND. ROOF/RIGID	FAN 2-9	208V/3/60	VFD & DISCONNECT FOR CANOPY HOODS		
15										16									
19	2	20A	8AWG	3/4" COND. ROOF/RIGID	FAN 2-10	208V/1/60	STARTER & DISCONNECT FOR SNORKELS			20	3	20A	8AWG	3/4" COND. ROOF/RIGID	FAN 2-4	208V/3/60	VFD & DISCONNECT FOR EF/HOOD 4		
21										22									
23	1	20A	8AWG	3/4" COND. ROOF/RIGID	SPARE	208V/3/60	VFD & DISCONNECT FOR EF/HOOD 2			24	3	20A	8AWG	3/4" COND. ROOF/RIGID	FAN 2-1	208V/3/60	VFD & DISCONNECT FOR EF/HOOD 1		
25										26									
29	1	20A	12AWG	1/2" COND.	HOOD #1	120V/1/60	HOOD #1 LEFT RECEPTACLE & LIGHT			30									
31	1	20A	12AWG	1/2" COND.	HOOD #1	120V/1/60	HOOD #1 RIGHT RECEPTACLE			32	1	20A	12AWG	1/2" COND.	HOOD #2	120V/1/60	HOOD #2 LEFT RECEPTACLE & LIGHT		
33	1	20A	12AWG	1/2" COND.	RECEPTACLES	120V/1/60	TV/PROJECTOR/SCREEN, EXHIBIT CABINET			34	1	20A	12AWG	1/2" COND.	HOOD #2	120V/1/60	HOOD #2 RIGHT RECEPTACLE		
35										36	1	20A			SPACE				
37										38					SPACE				
39										40					SPACE				
41										42					SPACE				

STUB ALL SPARES AND SPACES INTO ACCESSIBLE CEILING AND ACCESSIBLE FLOOR WITH 10-3/4"C.

NOTE: ALL PANELS SHALL HAVE TWO GROUNDE BARS, ONE ISOLATED.

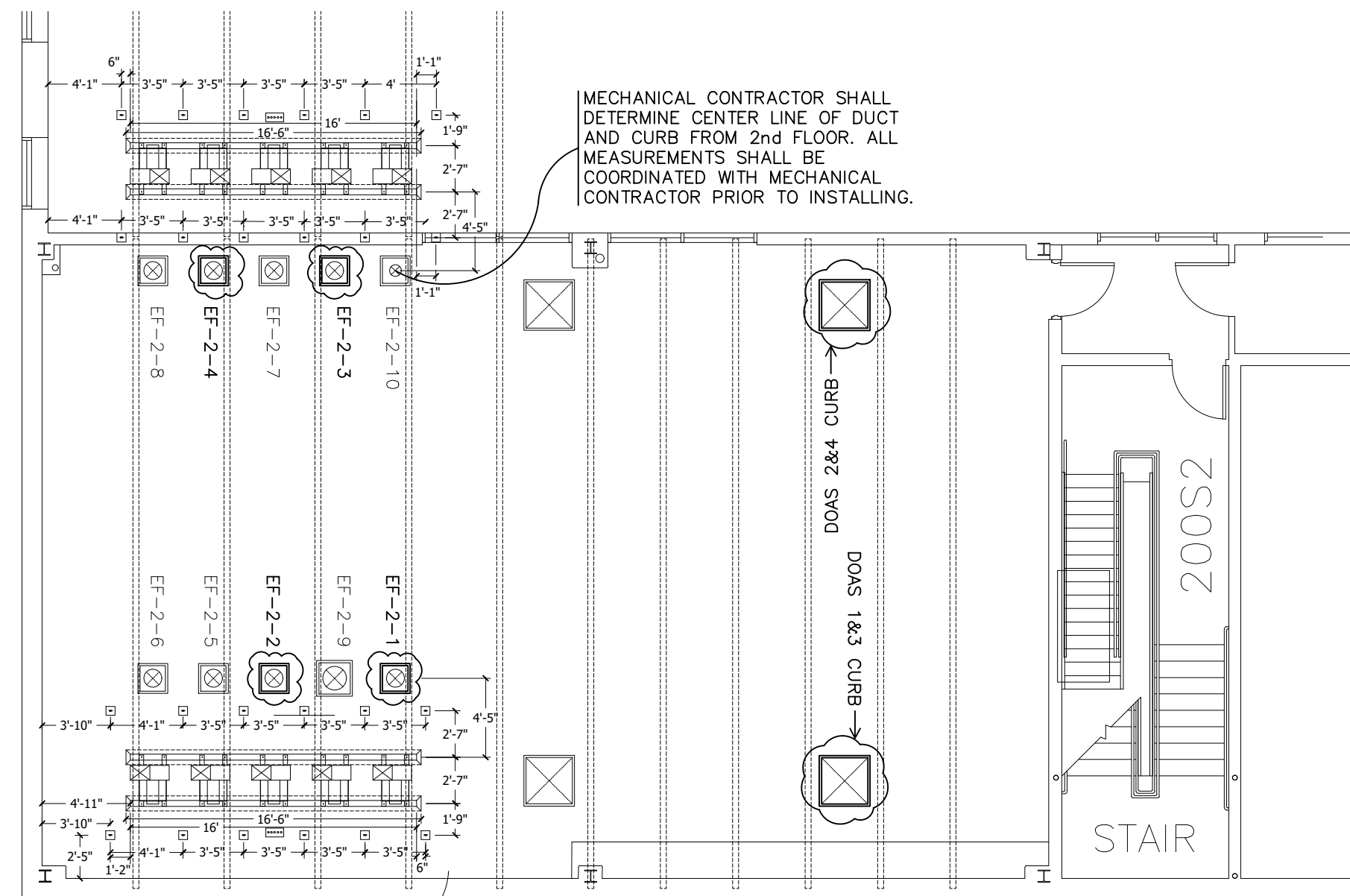
NEW ELECTRICAL SERVICE PANEL SCHEDULE										NEW ELECTRICAL SERVICE PANEL SCHEDULE									
PANEL: "LZ-A" 120/240V, 3Ø 4W - 2" COND. RECESSED NEMA-1 TYPE: PANELBOARD										PANEL: "LZ-A" 120/240V, 3Ø 4W - 2" COND. RECESSED NEMA-1 TYPE: PANELBOARD									
SINGLE SECTION										SINGLE SECTION									
200A MAIN BREAKER 10,000 AIC LOAD: 71.6 KW										200A MAIN BREAKER 10,000 AIC LOAD: 71.6 KW									
CKT	POLES	RATING	WIRE	MIN. COND.	USE	VOLTAGE	ROOM/EQUIPMENT			CKT	POLES	RATING	WIRE	MIN. COND.	USE	VOLTAGE	ROOM/EQUIPMENT		
1	2	60A	4 AWG	1"	HARDWIRE "N"	240V/1/60	FUEL CELL TABLE HIGH T FURNACE #3			2	2	40A	6 AWG	3/4"	HARD WIRE	240V/1/60	FUEL CELL TABLE HIGH T FURNACE #2 "M"		
3										4									
5	2	40A	6 AWG	3/4"	HARDWIRE "N"	240V/1/60	FUEL CELL TABLE HIGH T FURNACE #1			6	1	20A	10AWG	1/2"	RECEPTACLE	120V/1/60	FUEL CELL TABLE J-BOX RECEPTACLE "J"		
9	1	20A	10AWG	1/2"	RECEPTACLE	120V/1/60	FUEL CELL TABLE J-BOX RECEPTACLE "J"			8	1	20A	10AWG	1/2"	RECEPTACLE	120V/1/60	FUEL CELL TABLE J-BOX RECEPTACLE "J"		
11	1	20A	10AWG	1/2"	RECEPTACLE	120V/1/60	FUEL CELL TABLE J-BOX RECEPTACLE "L"			12	1	20A	10AWG	1/2"	RECEPTACLE	120V/1/60	FUEL CELL TABLE J-BOX RECEPTACLE "L"		
13	1	20A	10AWG	1/2"	RECEPTACLE	120V/1/60	FUEL CELL TABLE J-BOX RECEPTACLE "O"			14	1	20A	10AWG	1/2"	RECEPTACLE	120V/1/60	FUEL CELL TABLE J-BOX RECEPTACLE "O"		
15	1	20A	10AWG	1/2"	RECEPTACLE	120V/1/60	FUEL CELL TABLE J-BOX RECEPTACLE "O"			15	1	20A	10AWG	1/2"	RECEPTACLE	120V/1/60	FUEL CELL TABLE J-BOX RECEPTACLE "O"		
17	2	30A	6 AWG	3/4"	RECEPTACLE	240V/1/60	SNORKEL TABLE J-BOX RECEPTACLE "D"			16	2	30A	6 AWG	3/4"	RECEPTACLE	240V/1/60	SNORKEL TABLE J-BOX RECEPTACLE "B"		
19										20	1	20A	10AWG	1/2"	RECEPTACLE	120V/1/60	SNORKEL TABLE J-BOX RECEPTACLE "A"		
21	2	30A	6 AWG	3/4"	RECEPTACLE	240V/1/60	SNORKEL TABLE J-BOX RECEPTACLE "F"			22	1	20A	10AWG	1/2"	RECEPTACLE	120V/1/60	SNORKEL TABLE J-BOX RECEPTACLE "A"		
23										24	1	20A	10AWG	1/2"	RECEPTACLE	120V/1/60	SNORKEL TABLE J-BOX RECEPTACLE "C"		
25	2	20A	8 AWG	3/4"	HARD WIRE	240V/1/60	FUEL CELL TABLE TUBULAR FURNACE "K"			26	2	20A	8 AWG	1/2"	SPEC. RECEPT	240V/1/60	HOOD #5 LEFT SIDE FACE RECEPTACLE "5A"		
27										28									
29	1	20A			SPACE					29	2	20A	8 AWG	1/2"	SPEC. RECEPT	240V/1/60	HOOD #5 RIGHT SIDE FACE RECEPTACLE "5B"		
31	2	30A			SPACE					30									
33										31	1	20A			SPACE				
35										32					SPACE				
37										33					SPACE				
39										34	1	20A			SPACE				
41										35					SPACE				

STUB ALL SPARES AND SPACES INTO ACCESSIBLE CEILING WITH 10-1/2" AND 10-3/4"C.

NOTE: ALL PANELS SHALL HAVE TWO GROUNDE BARS, ONE ISOLATED.

NEW ELECTRICAL SERVICE PANEL SCHEDULE										NEW ELECTRICAL SERVICE PANEL SCHEDULE									
PANEL: "LZ-B" 120/208V, 3Ø 4W - 2" COND. SURFACE MOUNTED NEMA-3R TYPE: PANELBOARD										PANEL: "LZ-B" 120/208V, 3Ø 4W - 2" COND. SURFACE MOUNTED NEMA-3R TYPE: PANELBOARD									
SINGLE SECTION										SINGLE SECTION									
200A MAIN BREAKER 10,000 AIC LOAD: 71.6 KW										200A MAIN BREAKER 10,000 AIC LOAD: 71.6 KW									
CKT	POLES	RATING	WIRE	MIN. COND.	USE	VOLTAGE	ROOM/EQUIPMENT			CKT	POLES	RATING	WIRE	MIN. COND.	USE	VOLTAGE	ROOM/EQUIPMENT		
1	3	50A	8 AWG	1" COND. RIGID	CU-DOAS-1	208V/3/60	CU-DOAS-1 CONDENSER UNIT			2	3	50A	8 AWG	1" COND. RIGID	CU-DOAS-2	208V/3/60	CU-DOAS-2 CONDENSER UNIT		
3										4									
5										6									
7	3	50A	8 AWG	1" COND. RIGID	CU-DOAS-3	208V/3/60	CU-DOAS-3 CONDENSER UNIT			8	3	50A	8 AWG	1" COND. RIGID	CU-DOAS-4	208V/3/60	CU-DOAS-4 CONDENSER UNIT		
9										10									
11										12									
13	3	50A	8 AWG	1" COND. RIGID	CU-DOAS-5	208V/3/60	CU-DOAS-5 CONDENSER UNIT			14	3	50A	8 AWG	1" COND. RIGID	CU-DOAS-6	208V/3/60	CU-DOAS-6 CONDENSER UNIT		
15										16									
17										18									
19	3	50A	8 AWG	1" COND. RIGID	CU-DOAS-7	208V/3/60	CU-DOAS-7 CONDENSER UNIT			20	3	50A	8 AWG	1" COND. RIGID	CU-DOAS-8	208V/3/60	CU-DOAS-8 CONDENSER UNIT		
21										22									
23										24									
25	3	50A	8 AWG	1" COND. RIGID	HR-2-1	208V/3/60	HR-2-1 CONDENSER UNIT			26	1	20A	12AWG	1/2" COND. RIGID	RECEPTACLE	208V/3/60	UNDER PANEL "LZ-B"		
27										28					SPACE				
29										30					SPACE				
31										32					SPACE				

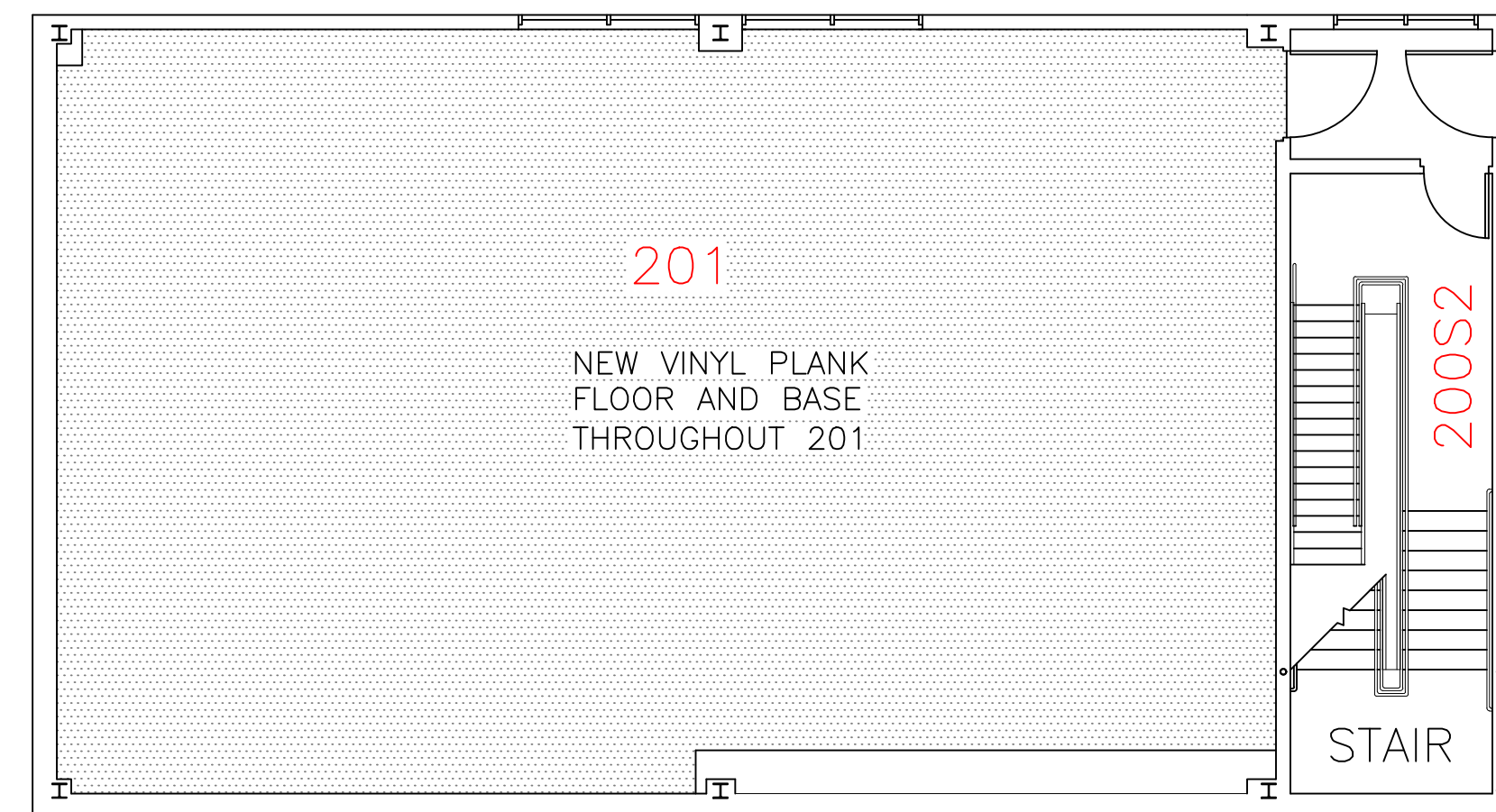
ALTERNATE NO.1



GENERAL NOTES: PHASE 1-ALTERNATE NO.1

1. FURNISH AND INSTALL (6) NEW ROOF CURBS AND ASSOCIATED ROOF WORK.
2. INSTALL NEW ROOF CURBS FOR EF-2-1, EF-2-2, EF-2-3, EF-2-4, DOAS 1 & DOAS 3 ROOF CURB FOR FRESH AIR INTAKE, AND DOAS 2 & 4 ROOF CURB FOR FRESH AIR INTAKE WHERE SHOWN ON ROOF AND PER THE DETAILS ON PLAN SHEET A3. COORDINATE WITH MECHANICAL CONTRACTOR FOR CURB LOCATIONS AND SIZES.
3. ALL CURBS SHALL SIT ON AND ANCHOR TO EXISTING METAL DECKING. ALL CURBS SHALL BE A MINIMUM HEIGHT OF 8" ABOVE FINISH ROOF.
4. AT EACH CURB FOR DUCT PENETRATION, CUT EXISTING DECK THE SIZE REQUIRED FOR DUCT TO PASS ONLY. DO NOT CUT OUT ALL OF DECKING FOR CURB SIZE. AFTER DUCT INSTALLATION THROUGH DECKING, SEAL DUCT AT DECKING AND INSTALL 6" OF UNFACED FIBERGLASS INSULATION IN CURB PRIOR TO INSTALLING CURB CAP.
5. NOTE THAT COLD APPLIED ROOF FLASHING SYSTEM IS NOT ACCEPTED. INSTALL HEATWELD DYNACIAD SYSTEM FOR ALL FLASHING, ROOF REPAIRS, AND NEW ROOF WORK.

ALTERNATE NO.3



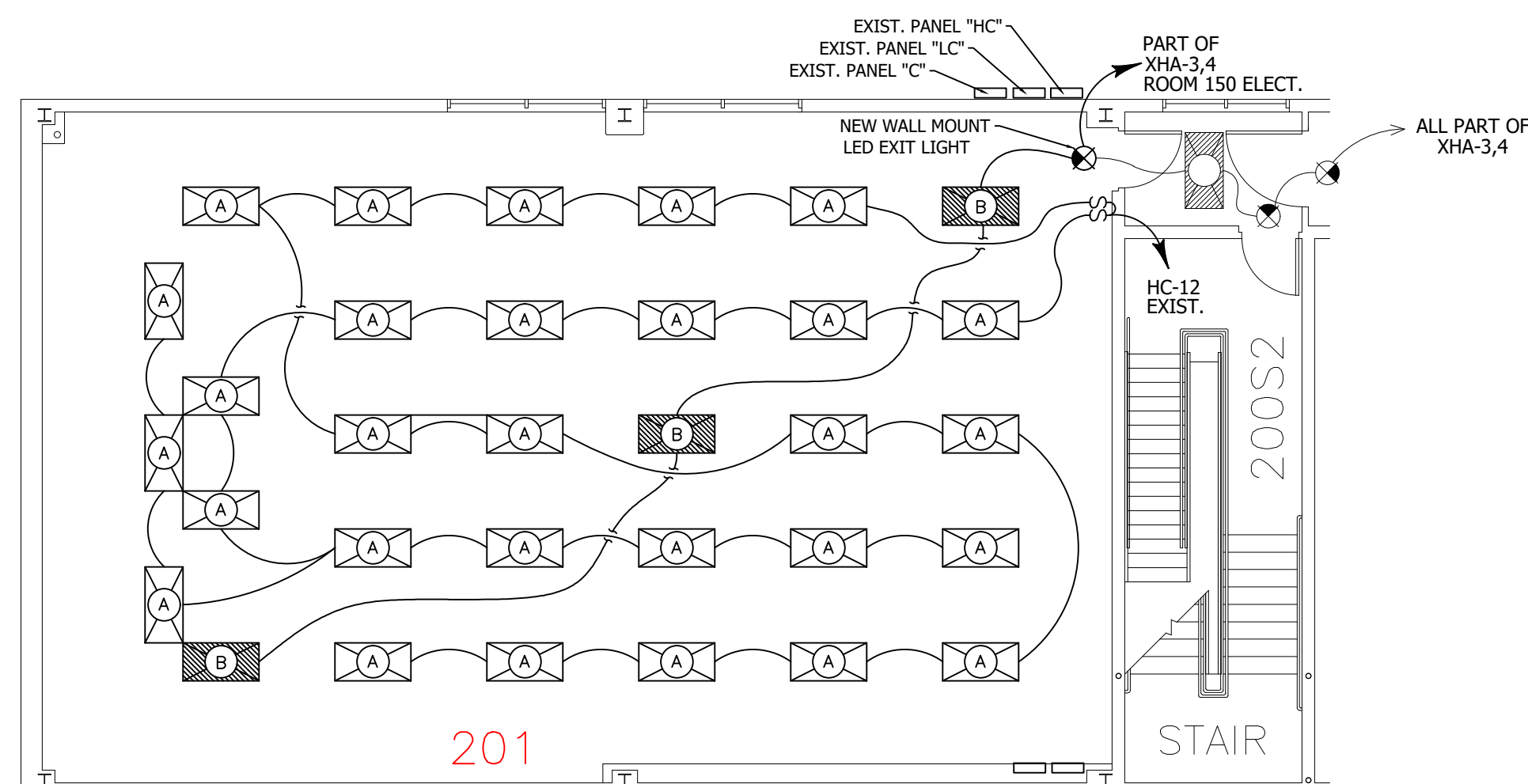
NEW FLOOR PLAN

NEW VINYL PLANK

GENERAL NOTES: PHASE 1 - ALTERNATE NO.3:

1. FURNISH AND INSTALL NEW VINYL PLANK FLOORING AND VINYL BASE THROUGHOUT ROOM 201.
2. REMOVE EXISTING CARPET AND GLUE IN ROOM 201.
3. CONTRACTOR SHALL PREP EXISTING CONCRETE FLOOR, APPLY FLOOR PATCH WHERE NECESSARY TO ACHIEVE MANUFACTURER'S RECOMMENDATIONS (AT NO COST TO THE UNIVERSITY).
4. FURNISH AND INSTALL NEW LUXURY VINYL PLANK (EARTHWERKS PORTIA - VANITY POR 734) IN ROOM 201 BY GLUE DOWN METHOD. PROVIDE A TRANSITION STRIP AT ROOM 201 ENTRANCE DOOR (IF NEEDED. CONSULT ULL). INSTALL 4" VINYL BASE (COLOR: BLACK) THROUGHOUT ROOM 201. INSTALL MOLDED OUTSIDE CORNERS FOR BASE. PROTECT NEW FLOOR FROM DAMAGE DURING THE INSTALLATION OF THE NEW LAB EQUIPMENT AND DURING CONSTRUCTION.

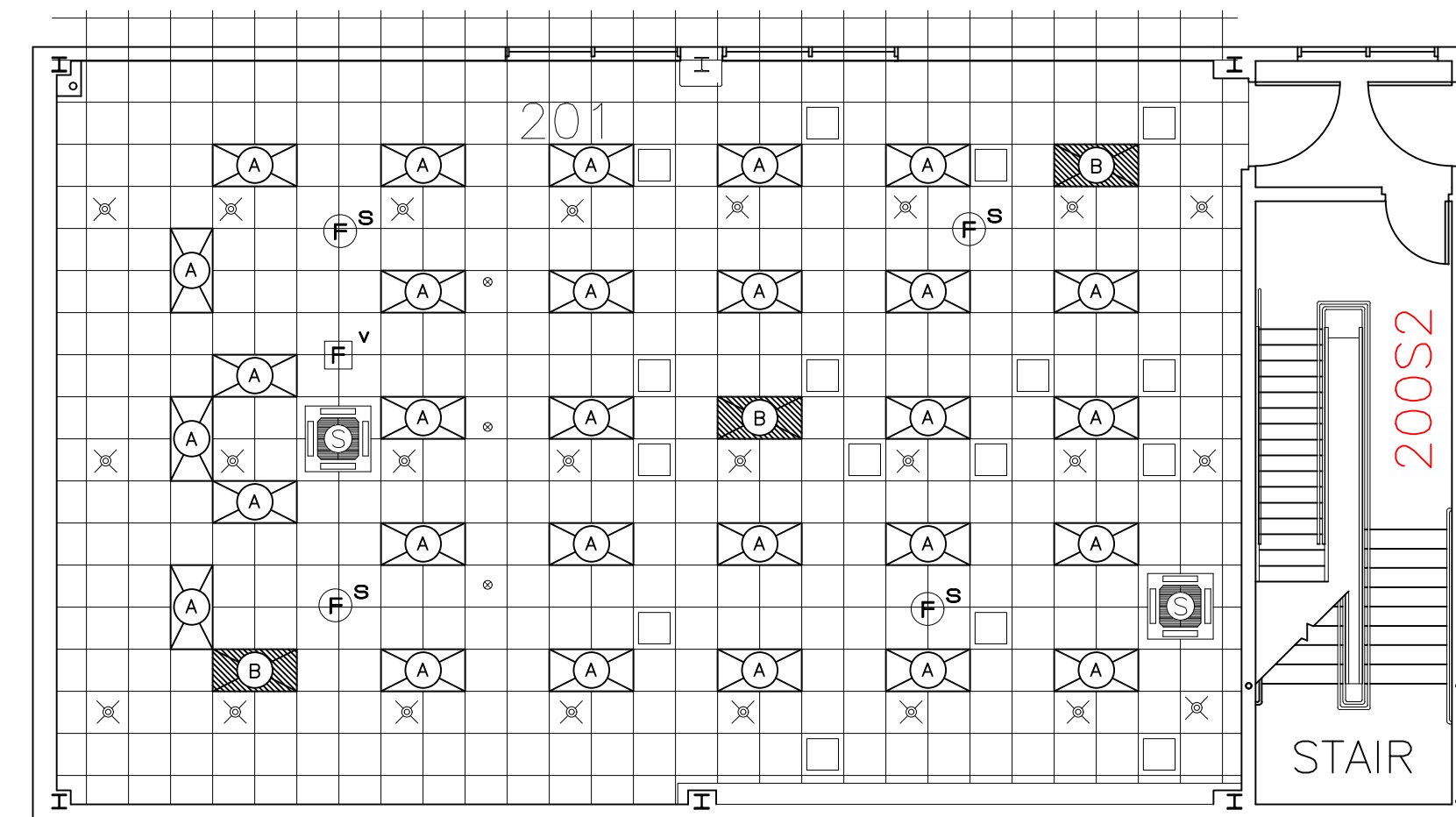
ALTERNATE NO.2



NEW LIGHT FIXTURE WIRING PLAN

ELECTRICAL NOTES:

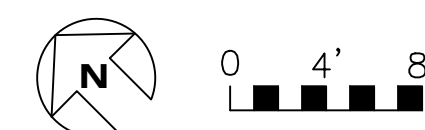
1. FURNISH AND INSTALL NEW LIGHT FIXTURES AND EXIT SIGN IN ROOM 201.
2. FURNISH AND INSTALL NEW 2' x 4' LED LAY-IN LIGHT FIXTURES (LITHONIA - 2FSL4 40L EZ1 LP835) IN CEILING AS SHOWN ON PLANS. CONNECT TO EXISTING CIRCUIT IN EXISTING PANEL "HC" CIRCUIT 12.
3. FURNISH AND INSTALL NEW 2' x 4' LED LAY-IN EMERGENCY LIGHT FIXTURES (LITHONIA - 2FSL4 40L EZ1 LP835 N8OEMG EL14L) IN NEW CEILING AS SHOWN ON PLANS. CONNECT TO EXISTING EMERGENCY POWER CIRCUIT (XHA-3,4).
4. FURNISH AND INSTALL A NEW WALL MOUNTED LED EXIT LIGHT (LITHONIA-LQC W 1 G EL N-LED) WHERE SHOWN AND CONNECT TO EXISTING EMERGENCY POWER CIRCUIT (XHA-3,4).
5. CONNECT NEW LIGHT FIXTURES TO NEW WALL SWITCHES AND EXISTING CIRCUIT.
6. MC CABLE ACCEPTABLE WHERE PERMISSIBLE.



LIGHT FIXTURE LAYOUT PLAN IN CEILING

- 2' x 4' LED LAY-IN LIGHT FIXTURE LITHONIA - 2FSL4 40L EZ1 LP835
- 2' x 4' LED LAY-IN LIGHT FIXTURE EMERGENCY GENERATOR POWER LITHONIA - 2FSL4 40L EZ1 LP835 N8OEMG EL14L
- TOGGLE SWITCH, MTD. 48" AFF
- EXIT LIGHT, WALL MOUNTED (LITHONIA-LQC W 1 G EL N - LED).

PHASE 1 - ALTERNATES NO. 1, 2, & 3



ALTERNATES CONSTRUCTION PLAN

GENERAL NOTES  
NO: REVISIONS: DATE:

ABDALLA HALL  
ROOM 201 RENOVATIONS - PHASE 1

UL FACILITY MANAGEMENT  
THE UNIVERSITY OF LOUISIANA AT LAFAYETTE  
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UNIVERSITY OF LOUISIANA AT LAFAYETTE  
FACILITY MANAGEMENT  
FILE NO: 13083 ABD. (201 RENO).DWG

PHASE 1  
ALT.1,2,3

PROJECT NO: SHEET:  
DATE: APRIL 2022  
SCALE: 1/4" = 1' - 0"

AL1